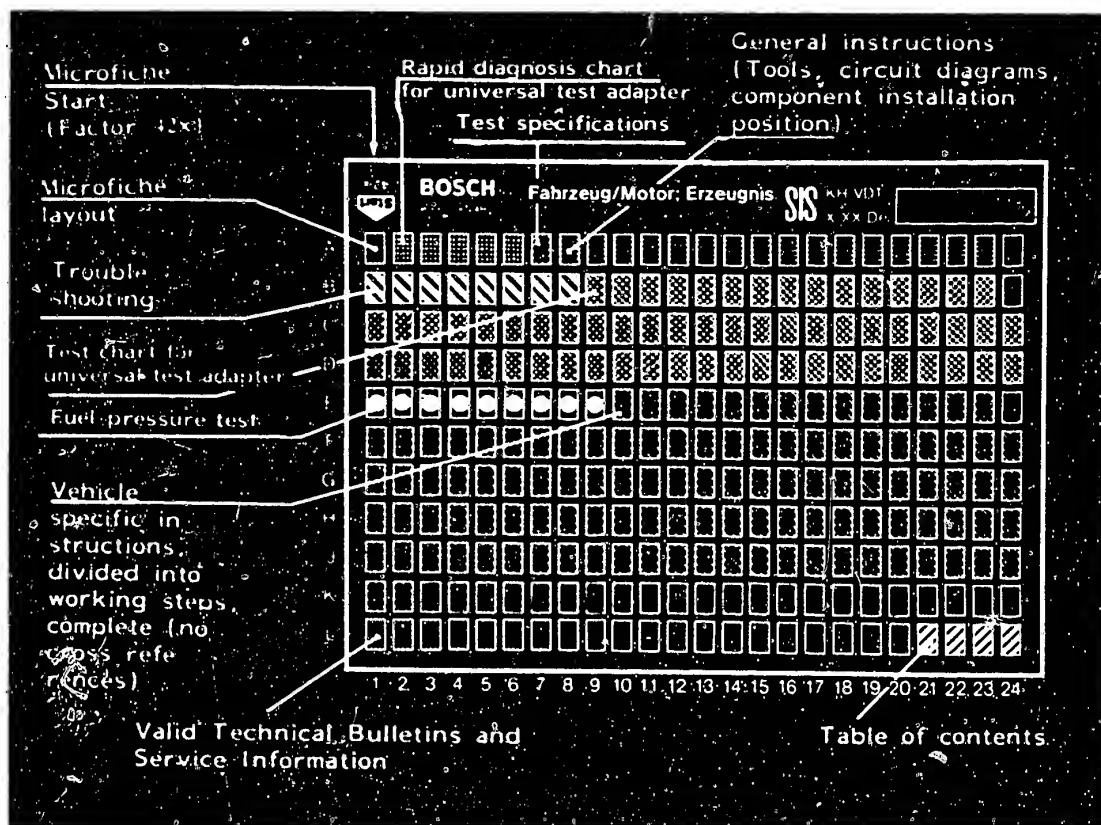


## Structure of microfiche



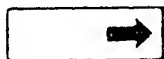
1. Read from left to right

2. Title of microfiche (appears on each coordinate)

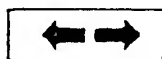
<b>E 16</b>	Product/assembly/test step	
	Vehicle/engine	

Coordinate

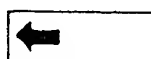
3. Limits of section



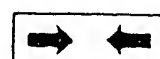
Beginning



Mid-section



End



One-page section

4. Purely vehicle-related passages identified by a vertical bar.

5. References to relevant test steps in test specifications; coordinate e.g. C6

**C 6**

**A1**

Trouble-shooting program



## Rapid diagnosis chart for universal test adapter

The following rapid diagnosis chart makes it possible for the experienced L-Jetronic expert to quickly check the electrical part of the system using the universal test adapter.

The rapid diagnosis chart contains the following information:

- Switch positions on the universal test adapter
- Sequence of test steps
- Notes on how to operate the universal test adapter or other equipment
- Readings on the multimeter
- References to coordinates of the relevant detailed testing and trouble-shooting program.

If detailed information and instructions are necessary, always proceed according to the trouble-shooting program starting on Coordinate B1/B2.



# Rapid diagnosis chart for universal test adapter

<u>Test step</u>	<u>Switch position</u>		<u>Remarks</u>	<u>Test specifications (reading)</u>	<u>See Coordinate for trouble-shooting</u>
	V	$\Omega$			
1	3	-	Shift gear to neutral. Operate starting motor. Measure voltage.	<u>8 ... 15 V</u>	B11
2	4	-	Shift gear to neutral. Operate starting motor. Measure voltage	<u>8 ... 15 V</u>	B15
3	5	-	Shift gear to neutral. Operate starting motor. Measure voltage pulses with motortester.	Ignition pulses on motortester	B21
4	6	-	Ignition "ON". Measure voltage.	<u>8 ... 15 V</u>	C 1
5	7	-	Ignition "ON". Measure voltage.	<u>8 ... 15 V</u>	C 4
6	8	-	Ignition "ON". Measure voltage.	<u>8 ... 15 V</u>	C 7
7	9	-	Ignition "ON". Measure voltage.	<u>8 ... 15 V</u>	C10
8	10	-	Ignition "ON". Measure voltage.	<u>8 ... 15 V</u>	C13
9	11	-	Ignition "ON". Deflect air-flow sensor flap. Measure voltage.	<u>8 ... 15 V</u>	C16
10	12	-	Ignition "ON". Measure voltage.	<u>8 ... 15 V</u>	C19
11	14	-	Ignition "ON". Measure voltage.	<u>8 ... 15 V</u>	C22

**A3**

Rapid diag.chart for universal test adpt.  
Opel Commodore, Senator, Monza













**A4**

Rapid diag.chart for universal test adpt.  
Opel Commodore, Senator, Monza



Rapid diagnosis chart for universal test adapter (continued)

Test step	Switch position		Remarks	Test specification (reading)	See Coordinate for trouble shooting
	V	$\Omega$			
12		6	Measure resistance. Deflect air-flow sensor flap.	0 280 202 007: 40...300 $\Omega$ 0 280 202 007 as of FD 147...024: 80...600 $\Omega$	D 1
13		7	Measure resistance.	0 280 202 007: 130...260 $\Omega$ 0 280 202 007 as of FD 147...024: 260...520 $\Omega$	D 3
14		8	Measure resistance.	0 280 202 007: 200...400 $\Omega$ 0 280 202 007 as of FD 147...024: 400...800 $\Omega$	D 5
15		9	Measure resistance. Accelerator in rest position.	0 ... 10 $\Omega$	D 7
16		10	Accelerator in full-load position. Measure resistance.	0 ... 10 $\Omega$	D 9
17		11	Measure resistance.	30 $\Omega$ ... 30 k $\Omega$ (depends on temperature)	D 11
18		12	Measure resistance.	30 $\Omega$ ... 30 k $\Omega$ (depends on temperature)	D 13
19		13	Measure resistance.	0 ... 10 $\Omega$	D 15
20		14	Measure resistance.	0 ... 10 $\Omega$	D 17
21		15	Measure resistance.	0 ... 10 $\Omega$	D 19

**A5**

Rapid diag.chart for universal test adpt.  
Opel Commodore, Senator, Monza



**A6**

Rapid diag.chart for universal test adpt.  
Opel Commodore, Senator, Monza





## Test specifications

**B7**

Idle speed 2.5E engine

Manually-shifted transmission 800...850 min<sup>-1</sup>

Automatic transmission

(selector lever in position P):800...850 min<sup>-1</sup>

Idle speed 3.0E engine

Manually-shifted transmission: 850...900 min<sup>-1</sup>

Automatic transmission

(selector lever in position P):850...900 min<sup>-1</sup>

Exhaust-gas setting

(2.5 E and 3.0 E engine)

CO concentration with engine at

normal operating temperature: max. 1.0 % by vol. CO

**E1**

Fuel pressure 2.5E engine

2.3...2.7 bar

Fuel pressure 3.0E engine

2.8...3.2 bar

Fuel pump delivery

2.5E engine:

min. 750 cm<sup>3</sup>/30 s

3.0E engine:

min. 850 cm<sup>3</sup>/30 s

**A7**

L-Jetronic test specifications

Opel Commodore, Senator, Monza



### Solenoid-operated injection valve

Electrical internal resistance: 2.5  $\Omega$

**B7**

Series resistance: 5...7  $\Omega$

### Auxiliary-air device

Electrical internal resistance

Manually-shifted transmission: 35...70  $\Omega$

Automatic transmission: 40...75  $\Omega$

**B5**

### Temperature sensors I and II

Electrical internal resistance

at ambient temperature

(+15° ... +30° C): 1.45...3.3 k $\Omega$

with engine at op. temp.

(approx. +80° C): 280... 360  $\Omega$

**B7**

### Air-flow sensor

Resistance between term. 7 and term. 8:

0 280 202 007 100... 500  $\Omega$

as of FD 147 200...1000  $\Omega$

0 280 202 024 200...1000  $\Omega$

**B5**

### Relay set

Resistance measurement between term. 86b  
and term. 85:

0 332 514 107/109 50... 110  $\Omega$

0 332 514 124 70... 500  $\Omega$

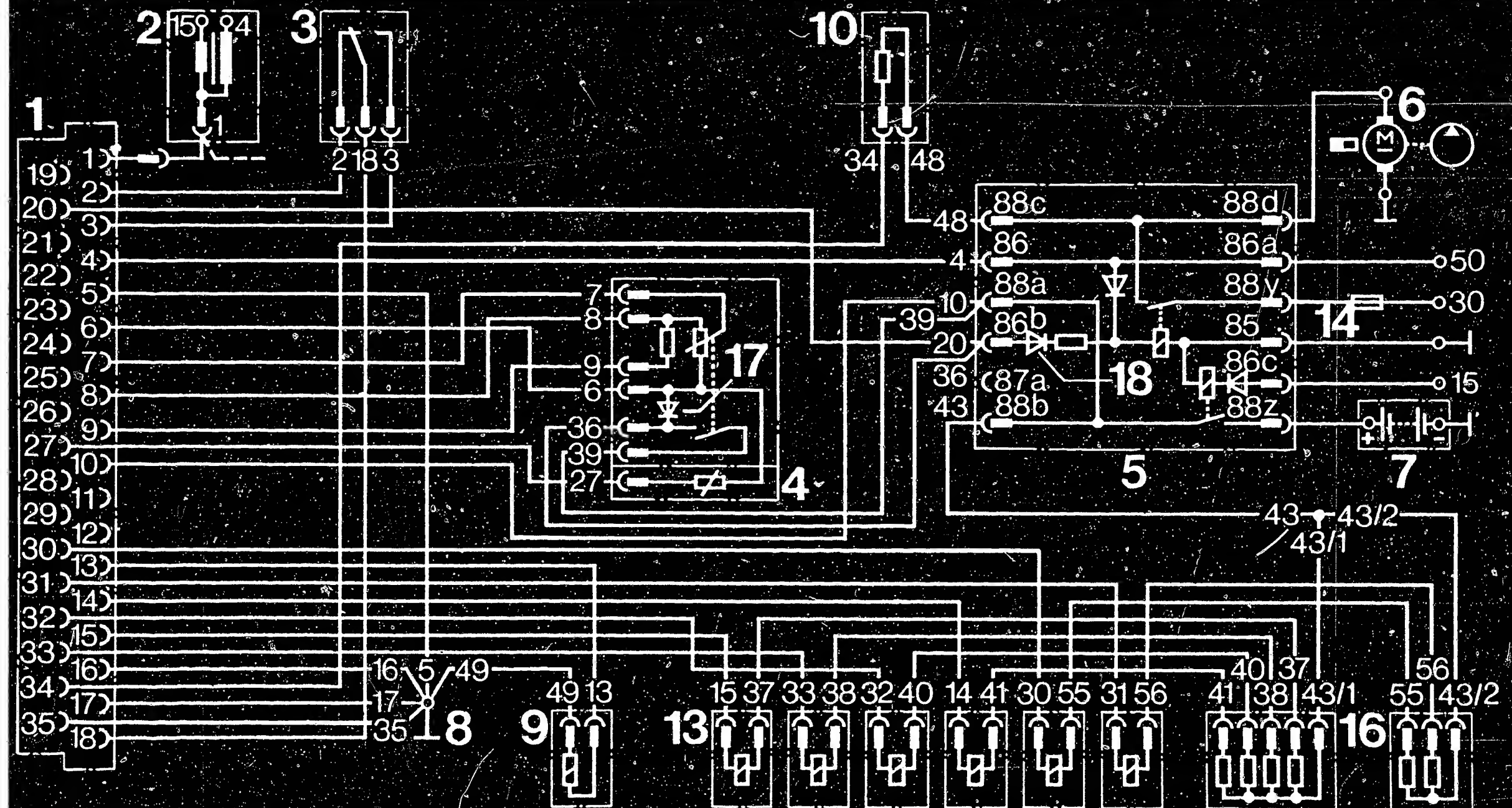
See equipment and Autodata microfiches for settings for  
ignition, valve clearance and other engine data.

**A8**

L-Jetronic test specifications

Opel Commodore, Senator, Monza





280|0554

Electrical terminal diagram of L-Jetronic

- |                           |                        |
|---------------------------|------------------------|
| 1 = Multiple plug         | 4 = Air-flow sensor    |
| 2 = Ignition coil         | 5 = Relay set          |
| 3 = Throttle-valve switch | 6 = Electric fuel pump |

- |                           |                                    |
|---------------------------|------------------------------------|
| 7 = Battery               | 14 = Pump fuse                     |
| 8 = Central ground        | 16 = Series resistor               |
| 9 = Temperature sensor    | 17 = Installed as of FD 051        |
| 10 = Auxiliary-air device | 18 = Not applicable with relay set |
| 13 = Injection valves     | 0 332 514 107/109                  |

**A9**

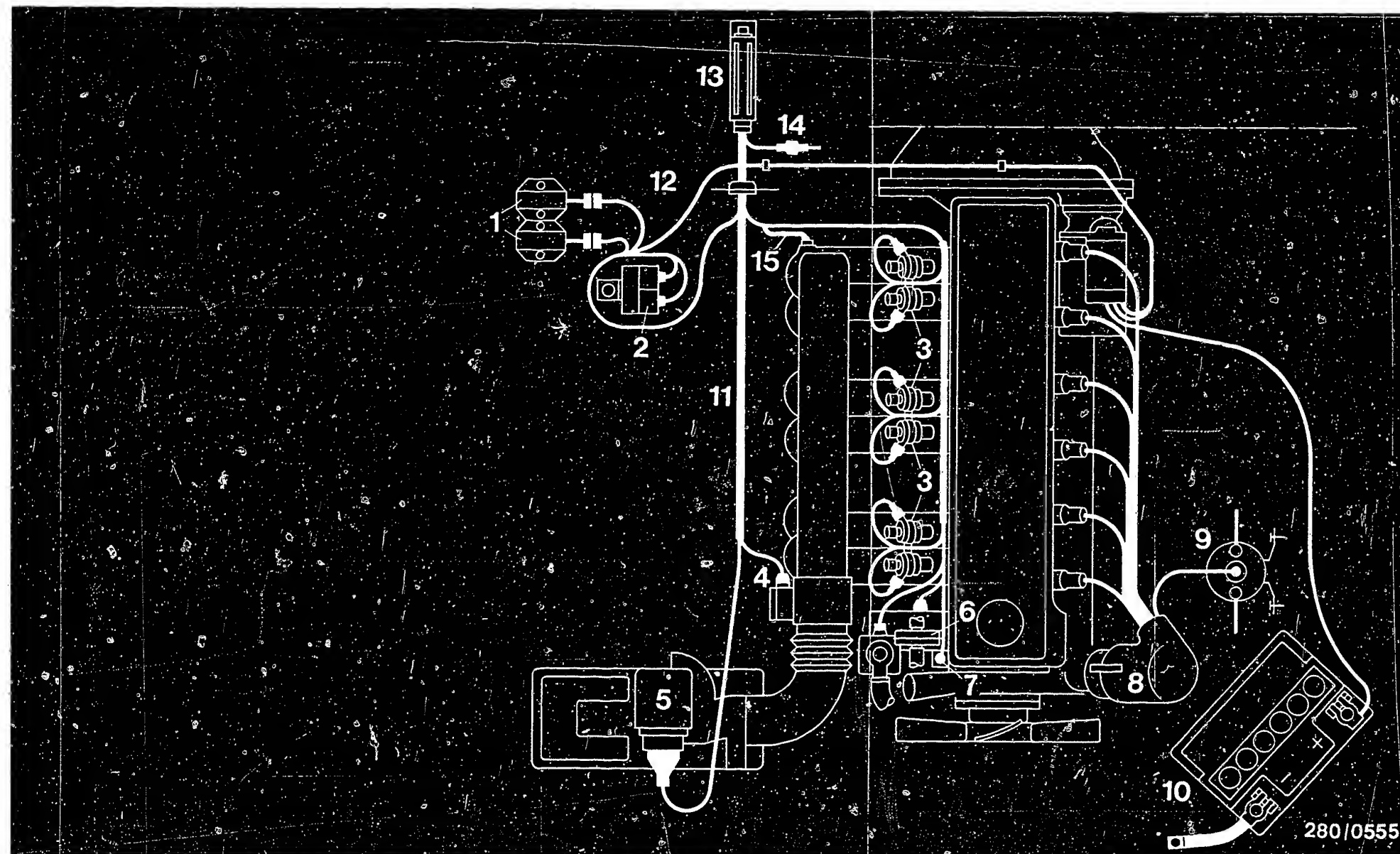
Electrical terminal diagram  
Opel Commodore, Senator, Monza



**A10**

Electrical terminal diagram  
Opel Commodore, Senator, Monza





Electrical wiring diagram of L-Jetronic and arrangement of individual components

1 = Series resistor  
2 = Relay set  
3 = Injection valves

4 = Throttle-valve switch  
5 = Air-flow sensor  
6 = Auxiliary-air device

7 = Temperature sensor II  
8 = Ignition distributor  
9 = Ignition coil

10 = Battery  
11 = Jetronic wiring harness  
12 = Vehicle wiring harness  
13 = Control unit  
14 = Plug-in connector term. 1  
15 = Central ground

**A11**

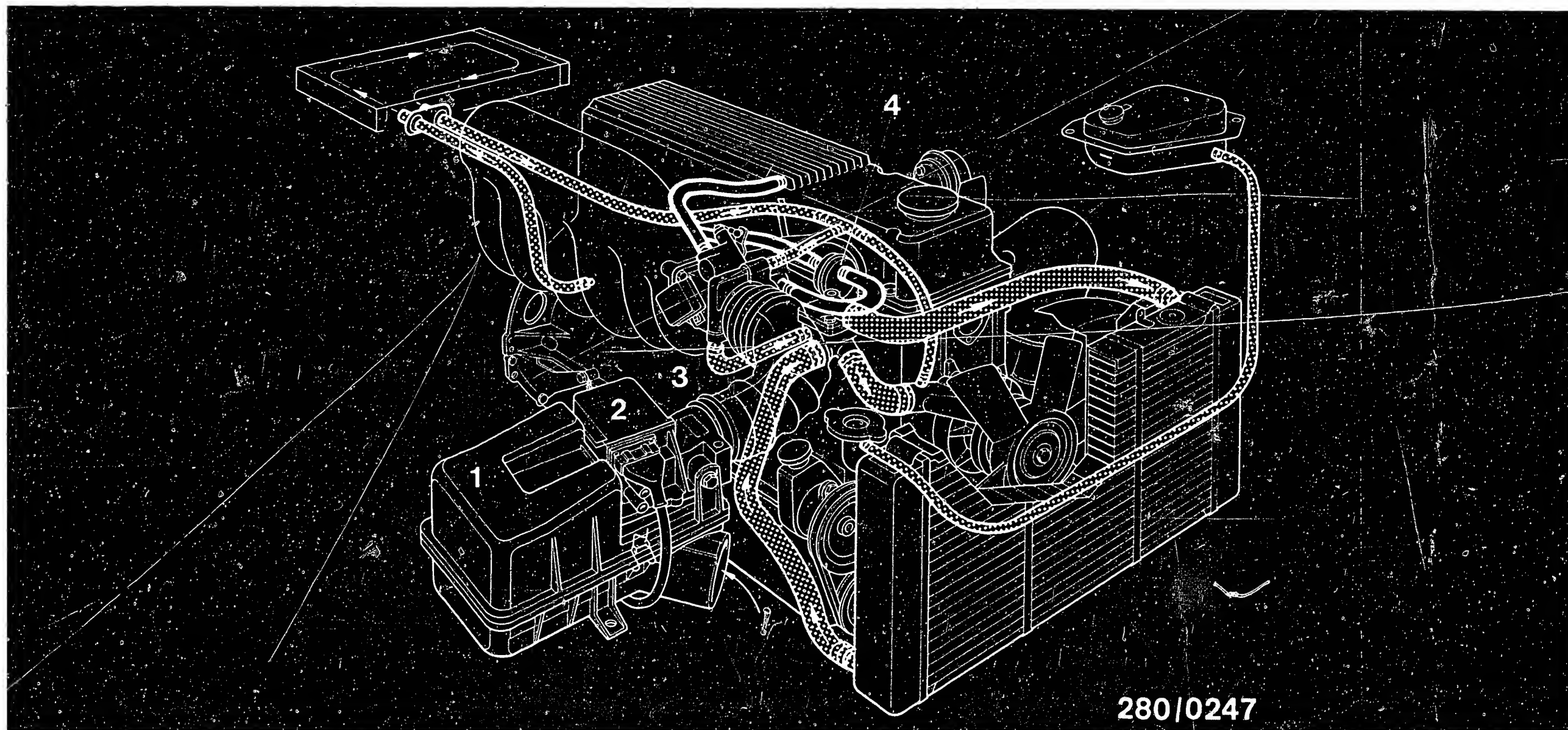
Electrical wiring diagram  
Opel Commodore, Senator, Monza



**A12**

Electrical wiring diagram  
Opel Commodore, Senator, Monza





280/0247

# Air and water hoses in engine compartment



Air



Water

1 = Air filter

2 = Air-flow sensor

3 = Air hose, air-flow sensor, throttle-valve assembly

4 = Auxiliary-air device

**A13**

Diagram of air and water hoses  
Opel Commodore, Senator, Monza



**A14**

Diagram of air and water hoses  
Opel Commodore, Senator, Monza



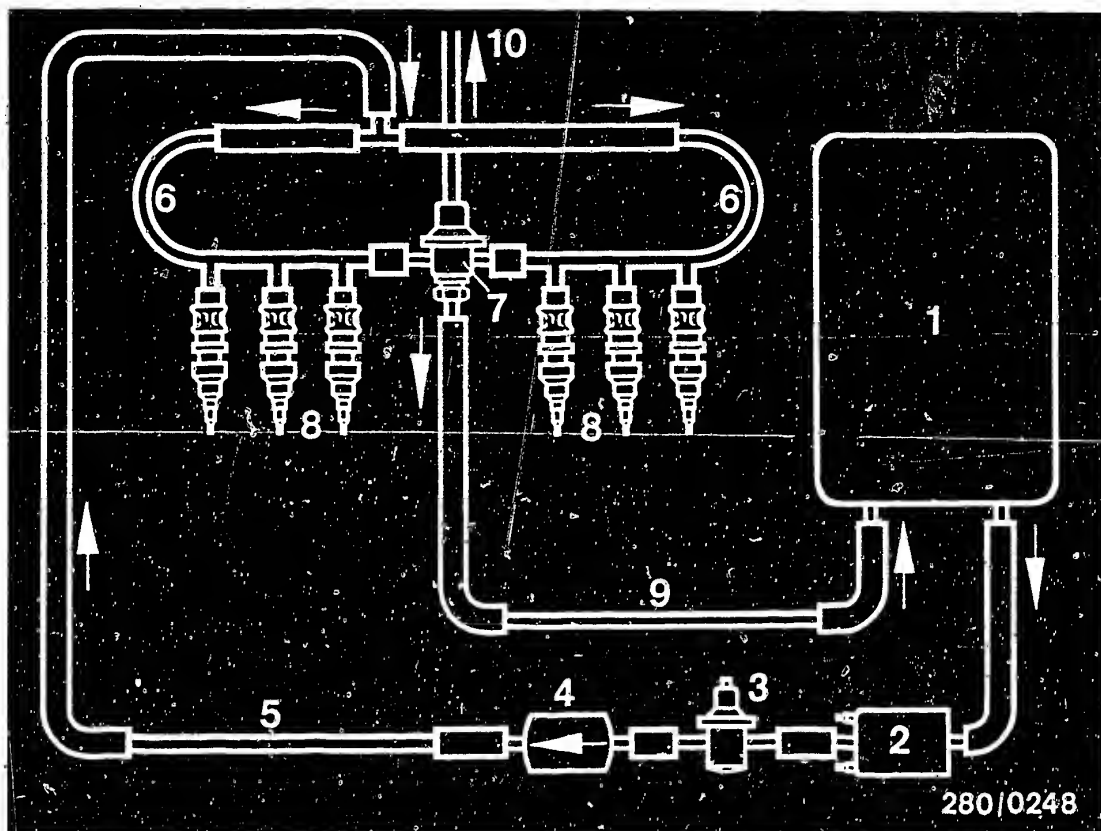


Diagram of fuel lines

- 1 = Fuel tank
- 2 = Electric fuel pump
- 3 = Fuel-line-pressure damper
- 4 = Fuel filter
- 5 = Fuel delivery line
- 6 = Fuel ring main
- 7 = Pressure regulator
- 8 = Solenoid-operated injection valve
- 9 = Fuel return line
- 10 = Connection to intake manifold

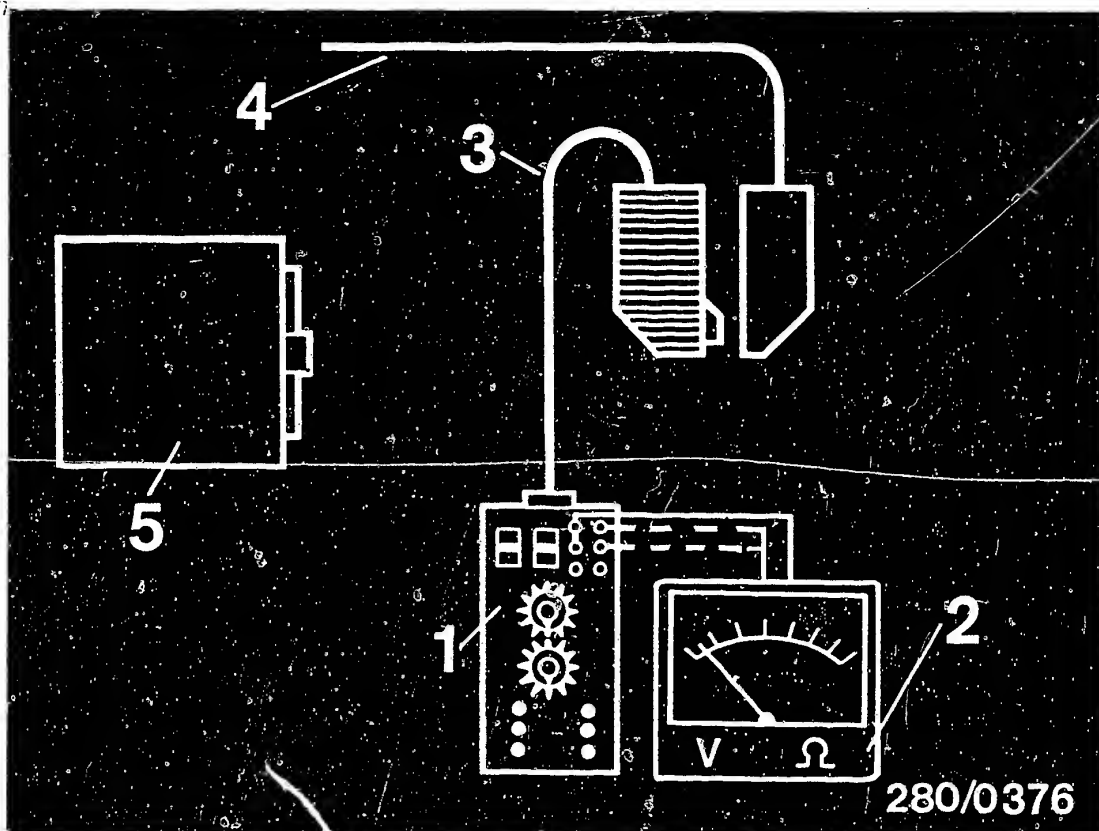


## TEST EQUIPMENT AND TOOLS

<u>Description</u>	<u>Designation</u>	<u>Part no.</u>
Universal test adapter	ETT 018.01	0 684 101 801
Adapter lead		1 684 463 129
Motortester	e.g. MOT 002.00	0 684 000 200
Exhaust-gas analyzer	e.g. ETT 008.00	0 684 100 800
Calibrated infrared exhaust-gas analyzers	ETT 008.004 or ETT 008.05	0 684 100 804 0 684 100 805
Pressure gauge	Quality class 1.0 = 6 bar 0.1 bar graduations	1 687 231 154
Three-way line		KDJE-P 100/13
Test lead		1 684 463 093
Pressure tester or Pressure tester (no longer available)		KDJE-P 100  KDEP 1034
Clamping fixture		1 688 120 093
Assembly mandrel		1 687 931 003
Parts set		1 287 010 701
Electrics tester or multimeter	e.g. ETE 014.00 e.g. Philips PM 2517 X e.g. Misco Master 50 K e.g. Chinaglia Cortina	0 684 101 400
Solenoid-operated injection valve		0 280 150 205
Hexagon-socket-screw key	AF 5	Commerically available
Use commercially available tools for fitting and removing the idle CO anti-tamper device on the air-flow sensor.		



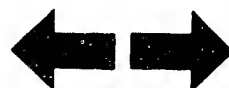




280/0376

- 1 = Universal test adapter
- 2 = Multimeter
- 3 = Adapter lead (L-Jetronic)
- 4 = Vehicle wiring harness
- 5 = L-Jetronic control unit

Universal test adapter with adapter lead for L-Jetronic  
 (Part No. 1 684 463 129)





Instructions for use of universal test adapter with  
adapter lead for L-Jetronic (Part No. 1 684 463 129)

General:

The universal test adapter is plugged onto the vehicle wiring harness with the adapter lead.

Caution:

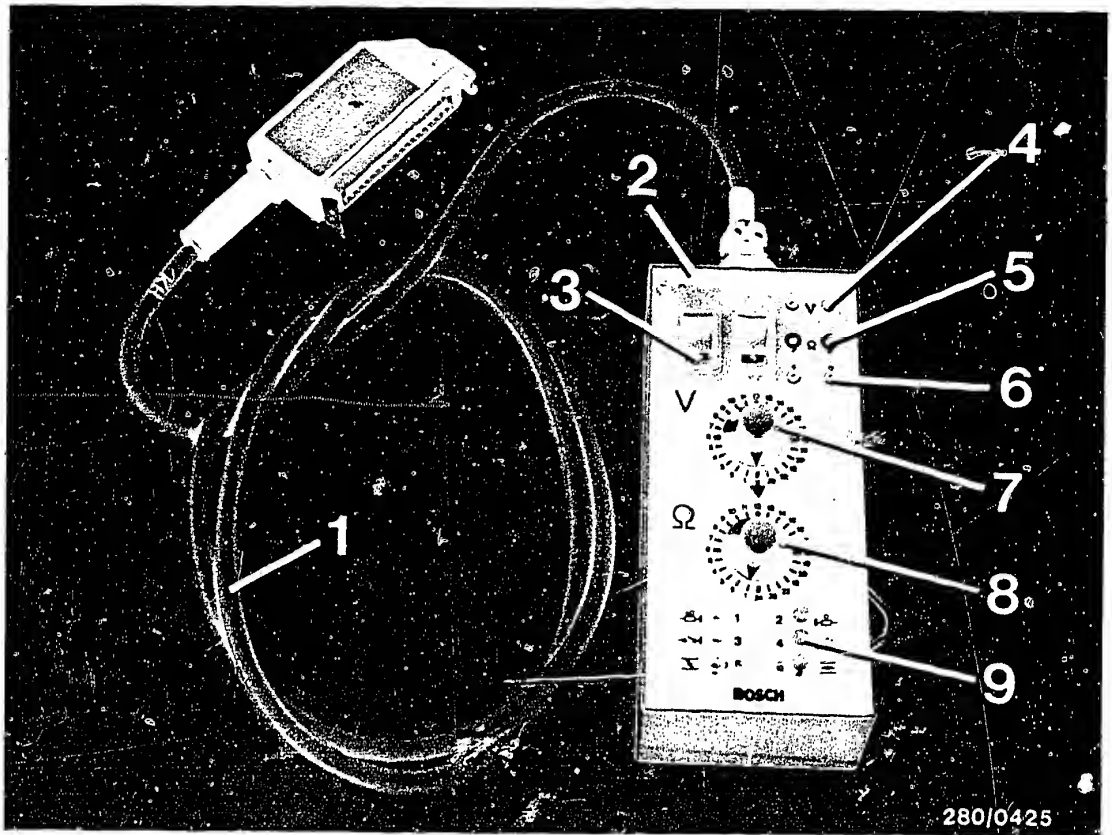
Connect and disconnect the universal test adapter only  
with the ignition off!

Testing:

For testing, a multimeter with  $R_i$  min. 20 k $\Omega$ /V is connected to the test adapter.

In addition, the signal from term. 1 of the ignition coil can be measured with a motortester via the special input.

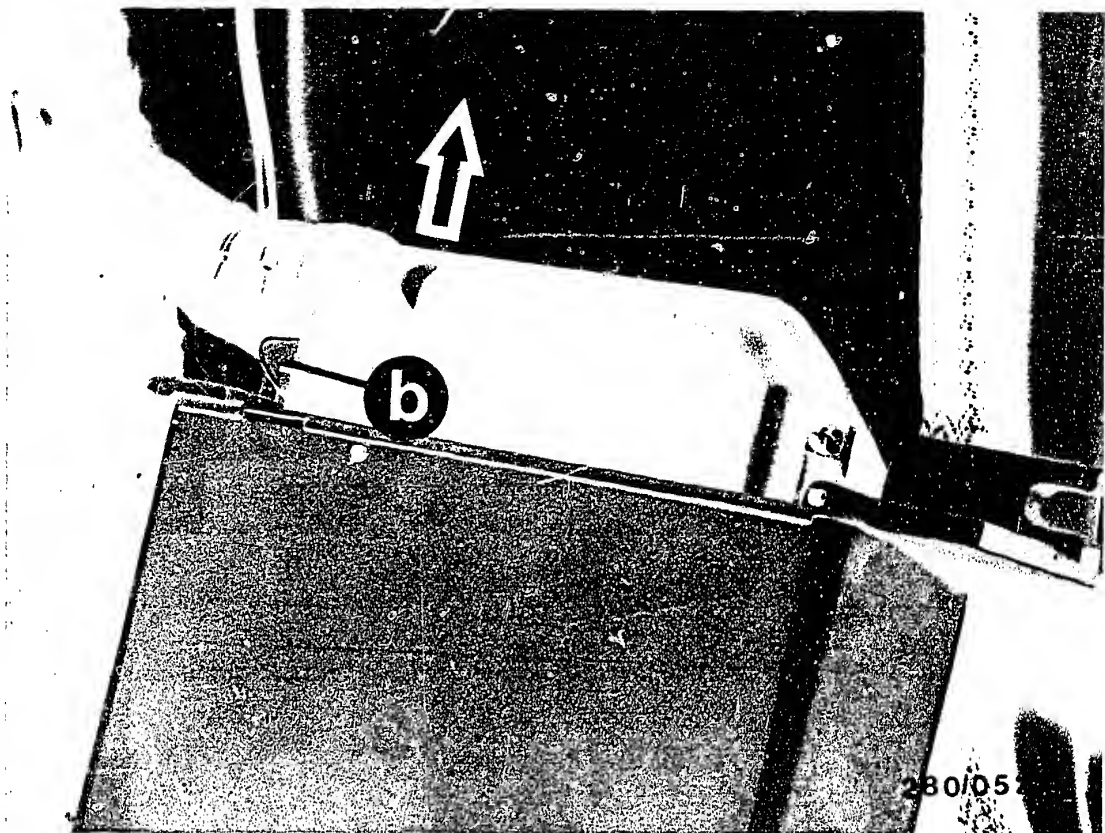




### Universal adapter with adapter lead for L-Jetronic

- 1 = Adapter lead (Part No.: 1 684 463 129)
- 2 = Universal test adapter (Part. No.: 0 684 101 801)
- 3 = Test wells (for motortester)
- 4 = Test sockets (for voltage measurement)
- 5 = Test sockets (for resistance measurement)
- 6 = Test sockets (not yet occupied)
- 7 = Program switch "Volt"
- 8 = Program switch "Ohm"
- 9 = Button panel (not occupied for L-Jetronic)





To remove the control unit, take out the side panelling on the right in the front passenger footwell. Unscrew both control unit fastening screws. Press the detent b to the rear so that the plug unlatches. Hinge up the plug in the direction of the arrow.

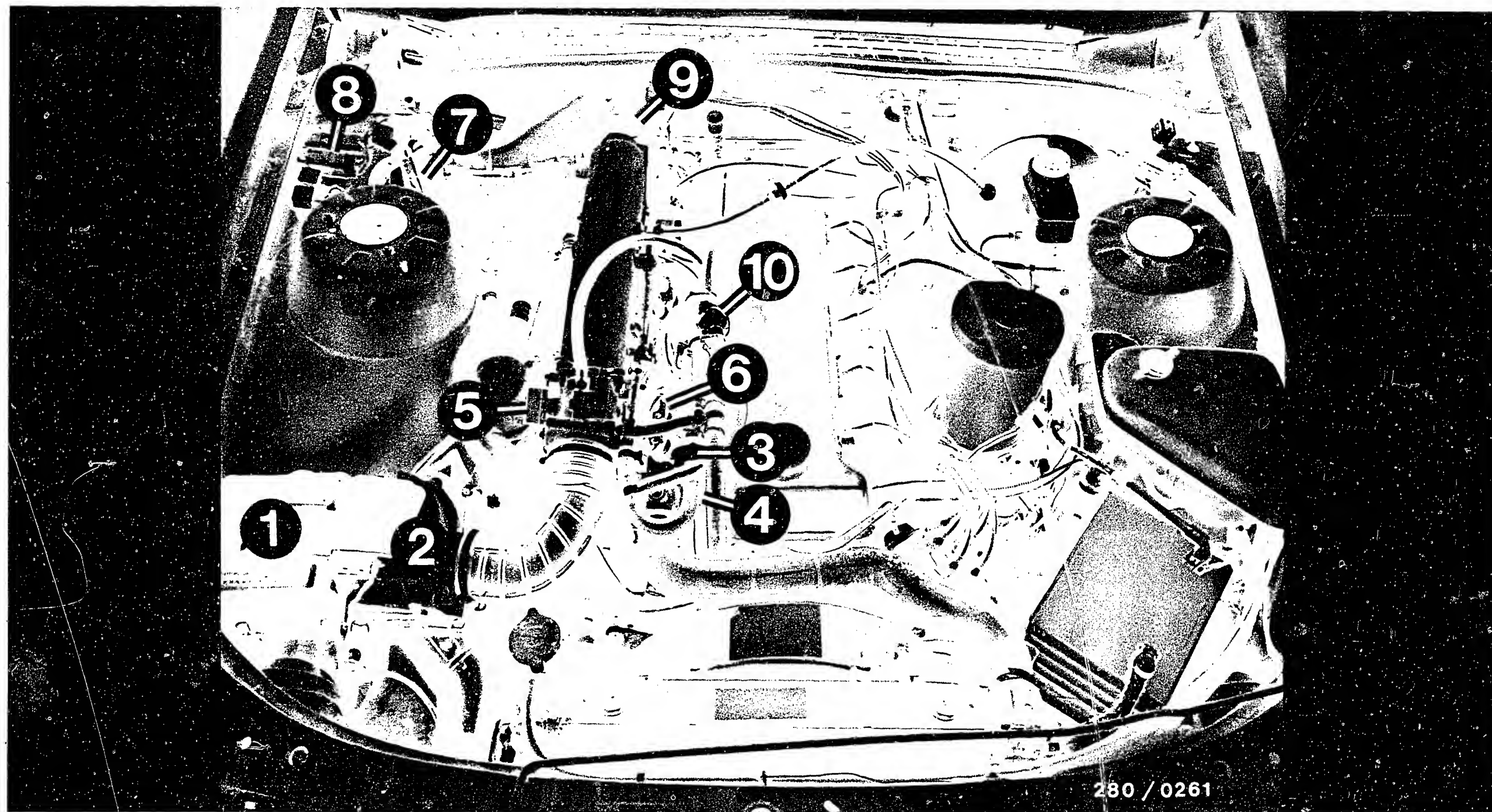
#### INSTALLATION POSITION OF COMPONENTS

The indications "right" and "left" always refer to the forward direction of travel:

##### Control unit

The control unit is in the passenger compartment, front passenger side, in the footwell at the bottom right.





Installation position of components (Opel Commodore, Senator, Monza)

1 = Air filter  
 2 = Air-flow sensor  
 3 = Auxiliary-air device  
 4 = Temperature sensor II (water)

5 = Throttle-valve switch  
 6 = Injection valves  
 7 = Relay set  
 8 = Series resistors

9 = Central ground  
 10 = Solenoid-operated air valve

**A21**

Electrical wiring diagram

Opel Commodore, Senator, Monza



**A22**

Electrical wiring diagram

Opel Commodore, Senator, Monza



### Important general information

1. Never start engine without securely connected battery.
2. Do not use a starting aid with more than 16 V or a fast charger for starting.
3. Never disconnect battery from vehicle electrical system with engine running.
4. Disconnect battery from vehicle electrical system when fast charging.
5. Remove control unit at temperatures above 80°C (paint-drying installation).
6. Ensure that all connectors of wiring harness are properly attached.
7. Never connect or disconnect wiring-harness plug of control unit with ignition switched on.
8. When testing compression, cut the red power supply lead between battery and relay set by disconnecting the plug-in connection.  
This ensures that the voltage supply for the L-Jetronic and therefore also for the injection valves is interrupted. Undesired injecting is thus prevented.
9. Remove the L-Jetronic control unit before carrying out electric welding work (e.g. spot welding).
10. When using the following trouble-shooting program it is assumed that the engine is in proper working order and that the ignition is correctly set. The electrical system must be checked and, if necessary, repaired.

In order to carry out the testing operations described in this manual and in order to assess the components, you should be familiar with the L-Jetronic and how it works. The essential points regarding the operation and construction of the L-Jetronic are described in Technical Instruction VDT-U 3/3 En.



## Trouble-shooting

The following trouble-shooting programs are designed to enable workshop employees, using the universal test adapter with adapter lead (1 684 463 129) and other suitable test equipment, to quickly locate causes of trouble on the L-Jetronic.

Depending on the level of knowledge and experience of the mechanic, a choice can be made between the following procedures:

- detailed step-by-step trouble-shooting for employees with little experience or practice on L-Jetronic vehicles
- pin-pointed direct trouble-shooting for trained, experienced employees who have had a great deal of practice on L-Jetronic vehicles.

**B3****B5**

Both trouble-shooting programs begin by checking the electrical part of the L-Jetronic with the aid of the universal test adapter with adapter lead. This makes it possible in a short space of time to check the electrical operation of the wiring harness with the connected components and to quickly detect faults.

If no fault is found with the universal test adapter with adapter lead, the fuel pressure test must be performed.

If this also reveals no fault, continue with the detailed or direct trouble-shooting program.

**B1**

Trouble-shooting

Opel Commodore, Senator, Monza

**B2**

Trouble-shooting

Opel Commodore, Senator, Monza



## 1. Detailed, step-by-step trouble-shooting

### 1.1 Test with universal test adapter

This test must come at the beginning of the test program and must be performed from beginning to end.  
(Coordinates B 9 ... D 21).

### 1.2 Fuel pressure test

This test must come after the test with the universal test adapter and must be performed from beginning to end  
(Coordinates E 1 ... E 12).

### 1.3 Trouble-shooting according to customer complaints (fault symptoms)

The following table contains possible symptoms of trouble and the right-hand column gives the first coordinate of the respective detailed trouble-shooting program.

This program consists of logically ordered test procedures for all individual components of the L-Jetronic. If, after completing the trouble-shooting program for an assumed symptom, the fault has not been detected or remedied, choose a new fault symptom and work through a different program.

<u>Customer complaints (fault symptoms)</u>	<u>Universal test adapter</u>	<u>Fuel pressure test</u>	<u>Coordinates</u>
1. Engine fails to start or starts only with great difficulty	B 9	E 1	E 13
2. Engine starts but then dies	B 9	E 1	F 1
3. Uneven engine idle	B 9	E 1	F 13
4. Poor throttle take-up	B 9	E 1	G 9
5. Engine missing under all operating conditions	B 9	E 1	H 1
6. Fuel consumption too high	B 9	E 1	H 17
7. No maximum engine power	B 9	E 1	J 5
8. CO concentration at idle too high or too low	B 9	E 1	J 17

**B3**

Trouble-shooting

Opel Commodore, Senator, Monza

**B4**

Trouble-shooting

Opel Commodore, Senator, Monza





## 2. Pin-pointed, direct trouble-shooting

### 2.1 Test with universal test adapter with system adapter lead

The test with the universal test adapter must come at the beginning of the test program and must be performed from beginning to end (see Coordinates B 9 ... D 21).

### 2.2 Fuel pressure test

This test must come after the test with the universal test adapter and must be performed from beginning to end (Coordinates E 1 ... E 12).

### 2.3 Trouble-shooting according to customer complaints

The following table contains various symptoms of trouble with several possible causes of the trouble in each case. The coordinate reference panel on the left indicates the first coordinate for the test procedure on the respective component of the L-Jetronic. If, after testing the individual components, the fault has not been detected or remedied, choose another fault symptom.

#### Customer complaint (fault symptom)

1. Engine fails to start or starts only with great difficulty								
2. Engine starts but then dies								
3. Uneven engine idle, idle speed incorrect								
4. Poor throttle take-up								
5. Engine missing under all operating conditions								
6. Fuel consumption too high								
7. No maximum engine power								
8. CO concentration at idle too high or too low								
Cause (component fault)								
B 9	B 9	B 9	B 9	B 9	B 9	B 9	B 9	Universal test adapter
E 1	E 1	E 1	E 1	E 1	E 1	E 1	E 1	Fuel pressure test: Relay set defective, fuel pump not operating, pressure regulator or pump contact defective.
E 15	F 3		G 15					Auxiliary-air device not opening
		F21						Auxiliary-air device not closing
E 19	F 7	G 1	G 15	H 7	H23	J13	J21	Air-flow sensor defective, noise test
	F 7			H 9				Pump contact in air-flow sensor defective

Continued on B 7 / B 8

**B5**

Trouble-shooting

Opel Commodore, Senator, Monza



**B6**

Trouble-shooting

Opel Commodore, Senator, Monza





# Customer complaints (fault symptoms)

1. Engine fails to start or starts only with great difficulty

2. Engine starts but then dies

3. Uneven engine idle, idle speed incorrect

4. Poor throttle take-up

5. Engine missing under all operating conditions

6. Fuel consumption too high

7. No maximum engine power

8. CO concentration at idle too high or too low

Cause (component fault)

E21	F11	G 3	G19			J15	K 1	Intake system leaking
		F21	G13	H 5	H 21	J11		Injection valves defective; connect test lead
				H 5				Connect test lead
				H11		J 9		Fuel delivery too low
E17	F 5	F19	G11		H19		J23	Temperature sensor II in engine defective
		F15	G21	H13				Throttle valve not closing
						J 7		Throttle valve not opening fully
E21	F11	G 3		H 3		J15		Poor central ground, loose contacts, faulty plug-in connections
				H 5				Voltage peaks, interference
						J 7		Throttle-valve switch defective
		F15	G21	H13	J 1		J19	CO exhaust-gas setting too rich, idle adjustment, solenoid-operated air valve
		F15	G21	H13			J23	CO exhaust-gas setting too lean, idle adjustment, burbling
				H11		J11		Control unit defective

**B7**

Trouble-shooting

Opel Commodore, Senator, Monza



**B8**

Trouble-shooting

Opel Commodore, Senator, Monza



Test chart for universal test adapter  
with connected adapter lead (1 684 463 129)

Opel 2.5 1/3.0 1 Commodore, Senator and Monza

Carefully plug the universal test adaptor onto the vehicle wiring harness. (Ignition must be off).

Only the peripherals are tested.

A multimeter for measuring voltage and resistance as well as a motortester should be connected to the universal test adaptor in order to make the readings.

The individual test steps are selected by means of two program switches (one for voltage measurements and the other for resistance measurements). Each program switch has 24 test positions but not all are occupied when testing the L-Jetronic. Be sure to follow the instructions in the test chart.

In test steps 1...11 voltages are measured during starting.

Caution: Set the multimeter to the voltage measuring range.

In test steps 12...21 resistances are measured.

Caution: Set the multimeter to the resistance measuring range. During trouble-shooting, switch off ignition and disconnect multiple plug from adaptor lead.

Test specifications and operating instructions for the universal test adaptor are given in the following test chart.

Installation position of control unit

The control unit is in the passenger compartment, in the front passenger footwell at the bottom right. It is secured by three screws.



## Requirements for correct test procedure

1. Start testing at test step 1.
2. The order of the test steps must be kept to. The trouble-shooting instructions carry on in each case from the trouble-shooting instructions given for the previous test step.  
Example:  
If in test step 1, for example, the ground connection term. 85 for the relay set is tested, this test is not repeated in the following test steps.
3. If an incorrect reading is indicated for a test step, the test step in question must be repeated after the fault has been remedied.



### Note:

In the following test steps a white border in der "Operation" column indicates which operation has to be changed in comparison with the preceding test step.

### Test step 1

<u>Operation</u>		<u>Reading</u>	<u>Testing</u>
<u>Program switch "V"</u> <u>at position:</u>	3	Multimeter must indicate <u>8...15 V.</u>	<u>Component:</u> Relay set Starting motor term. 50
<u>Program switch "Ω"</u> <u>at position:</u>	- *		
<u>Measuring equipment:</u> Multimeter (Volt range)			<u>Operation:</u>
<u>Measuring range:</u> 0...15 V			Starting signal
<u>Connection:</u> Test sockets red (positive) and black			<u>Malfunction:</u>
<u>Operation in vehicle:</u> Ignition "ON" and start engine			No voltage reading

### Trouble-shooting:

\* Switch position not specified

### For all voltage measurements:

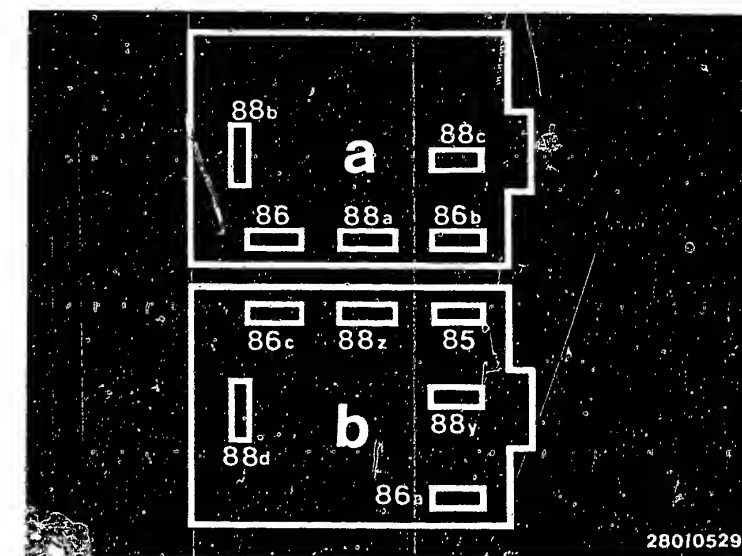
1. Set value 8...15 V (starting).
2. Make measurement at the respective component connector.
3. The connector remains plugged onto the relay set.

### For resistance measurements:

For testing, remove the wiring-harness plug from the test adaptor and use the circuit diagram if necessary. Set value approx. 0Ω.

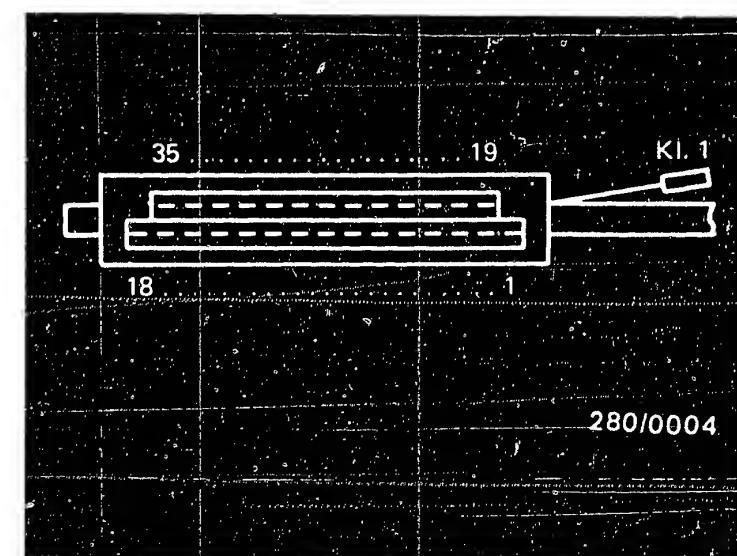
Important! Ignition "OFF" and ensure that good electrical contact is made when measuring.

Continued on B 13/14



Top view of connection base  
(viewed from below)  
a=Jetronic wiring harness  
b=Vehicle wiring harness

Top view of multiple plug



**B 11**

Test chart for universal test adapter  
Opel Commodore, Senator, Monza



**B 12**

Test chart for universal test adapter  
Opel Commodore, Senator, Monza



## TEST STEP 1 (continued)

Voltage reading below 8 V:

Battery insufficiently charged or high voltage drops.

No voltage reading:

1. Voltage present at relay set term. 86a? If no voltage, check lead to starting motor term. 50.

Test ground connection from multiple plug term. 5 to central ground

2. Voltage present at relay set term. 86? If no voltage, replace relay set.

3. Test lead from relay set term. 86 to multiple plug term. 4.

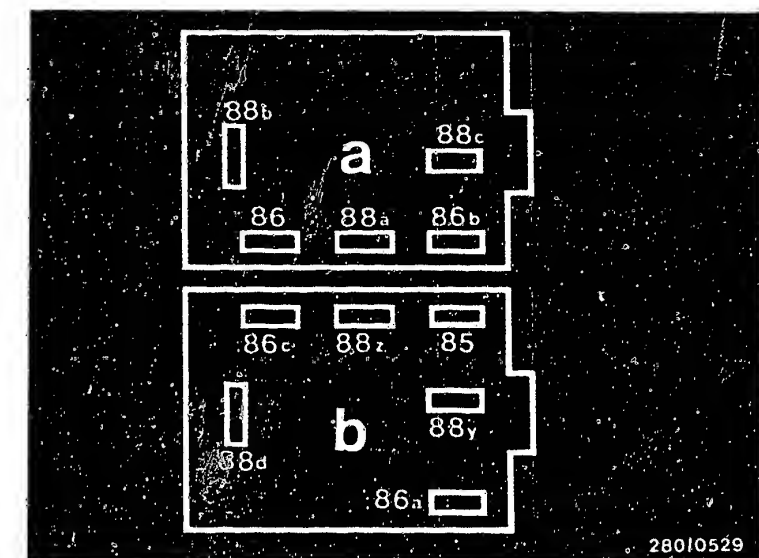
Eliminate contact resistances at the plug-in connections.

Installation position of components:

Relay set: On right in engine compartment on side firewall

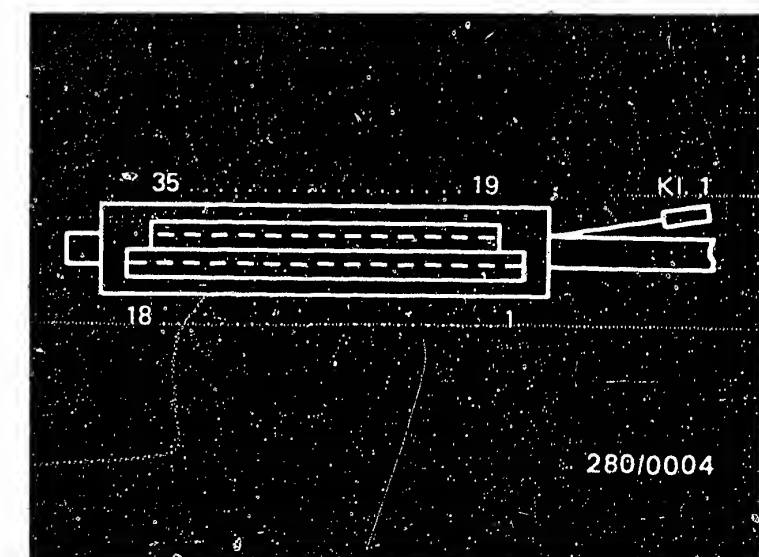
Central ground: On intake manifold at rear, near start valve (if fitted)

Control unit: In passenger compartment, in front passenger footwell at bottom right.



View onto connection bases  
(viewed from below)  
a = Jetronic wiring harness  
b = Vehicle wiring harness

Top view of multiple plug



**B 13**

Test chart for universal test adapter  
Opel Commodore, Senator, Monza



**B 14**

Test chart for universal test adapter  
Opel Commodore, Senator, Monza



TEST STEP 2		
Operation	Reading	Testing
<u>Program switch "V"</u> <u>at position</u>	4	<u>Component:</u> Auxiliary-air device, Relay set
<u>Program switch "Ω"</u> <u>at position</u>		
<u>Measuring equipment:</u> Multimeter (Volt range)	Multimeter must indicate <u>8...15 V.</u>   <	

#### Trouble-shooting

For all voltage measurements:

1. Set value 8...15 V (starting).
2. Make measurement at the respective component connector.
3. The connector remains plugged onto the relay set.

For resistance measurements:

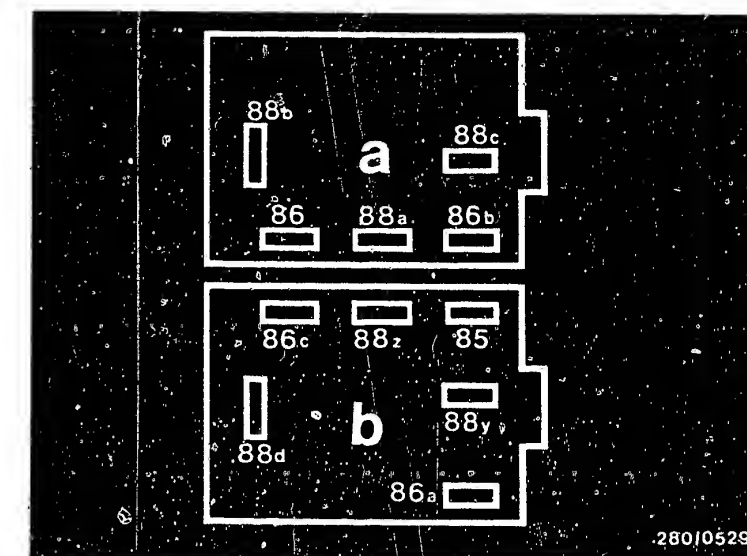
For testing, remove the wiring-harness plug from the test adaptor and use the circuit diagram if necessary. Set value approx. 0Ω.

Important! Ignition "OFF" and ensure that good electrical contact is made when measuring.

#### I. Start engine, electric fuel pump operating.

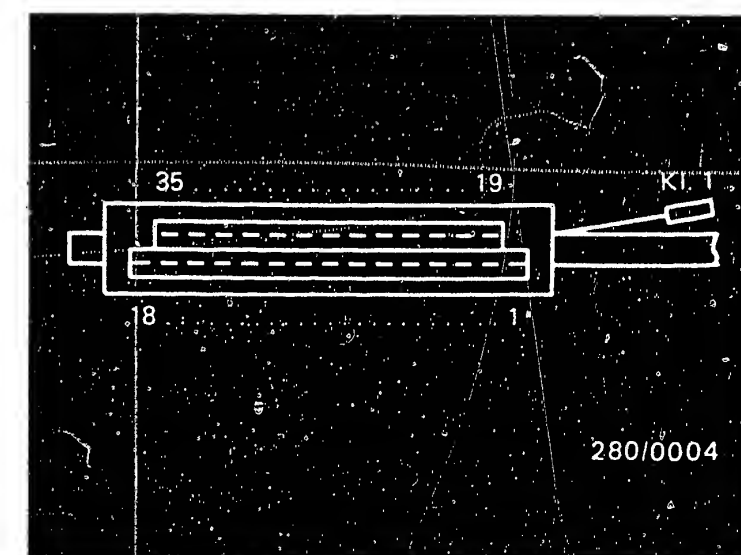
1. Voltage present at relay set term. 88c? If no voltage, test lead from relay set term. 85 to vehicle ground. If fault not eliminated, replace relay set.

Continued on B17 / B18



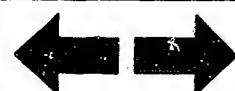
View onto connection bases  
(viewed from below)  
Relay set  
a = Jetronic wiring harness  
b = Vehicle wiring harness

Top view of multiple plug



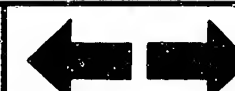
**B15**

Test chart for universal test adapter  
Opel Commodore, Senator, Monza



**B16**

Test chart for universal test adapter  
Opel Commodore, Senator, Monza



## TEST STEP 2 (continued)

2. Voltage present at auxiliary-air device term. 4? If no voltage, test lead 48 from auxiliary-air device to relay set term. 88c.

3. Test auxiliary-air device for continuity.

### Set value

For auxiliary-air device 0 280 140 119:  $40...75\ \Omega$

For auxiliary-air device 0 280 140 104:  $35...70\ \Omega$

If incorrect, replace auxiliary-air device.

4. Test lead 34 from auxiliary-air device to multiple plug term. 34.

## II. Start engine, electric fuel pump does not operate.

1. Voltage present at relay set term. 88y? If no voltage, test pump fuse and power supply term. 30.

2. Voltage present at relay set term. 88 d? If no voltage, replace relay set.

3. Test electric fuel pump and leads (ground connection).

### Installation position of components

Relay set: On right in engine compartment near firewall.

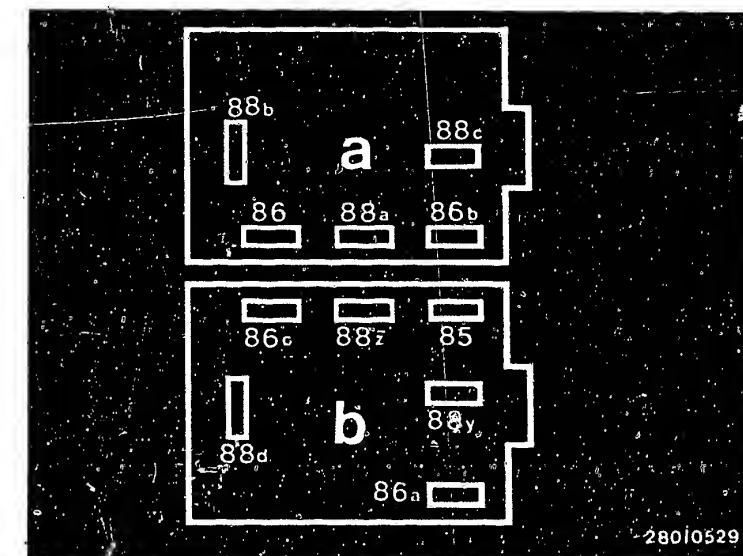
Control unit: In passenger compartment, in front passenger footwell at bottom right.

Auxiliary-air device: At front on engine block on right.

Fuel pump fuse: In fuse box on driver's side, under instrument panel on left.

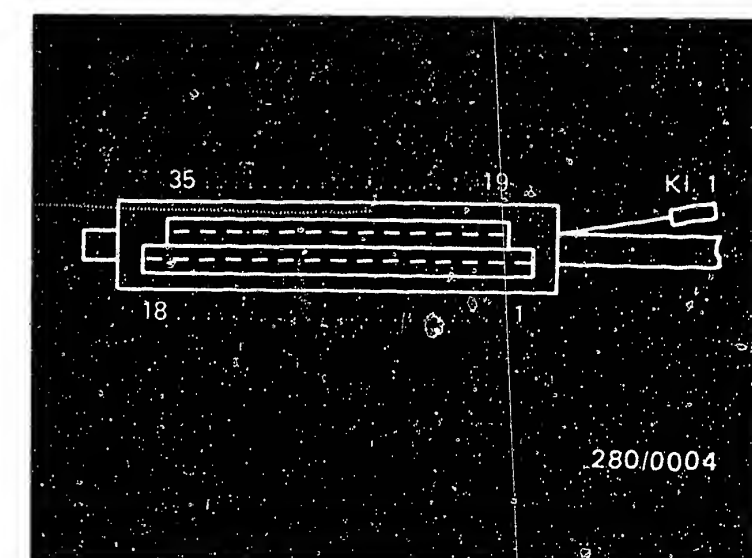
Electric fuel pump: Under vehicle, on right behind rear wheel.

Continued on B19/B20



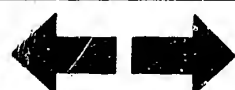
View onto connection bases  
(viewed from below)  
a = Jetronic wiring harness  
b = Vehicle wiring harness

Top view of multiple plug



**B17**

Test chart for universal test adapter  
Opel Commodore, Senator, Monza



**B18**

Test chart for universal test adapter  
Opel Commodore, Senator, Monza



## TEST STEP 2 (continued)

4. Voltage present at relay set term. 88c? If no voltage, test lead from relay set term. 85 to vehicle ground. If fault not remedied, replace relay set.

5. Voltage present at auxiliary-air device term. 48? If no voltage, test lead 48 from auxiliary-air device to relay set term. 88c.

6. Test auxiliary-air device for continuity.

### Set value

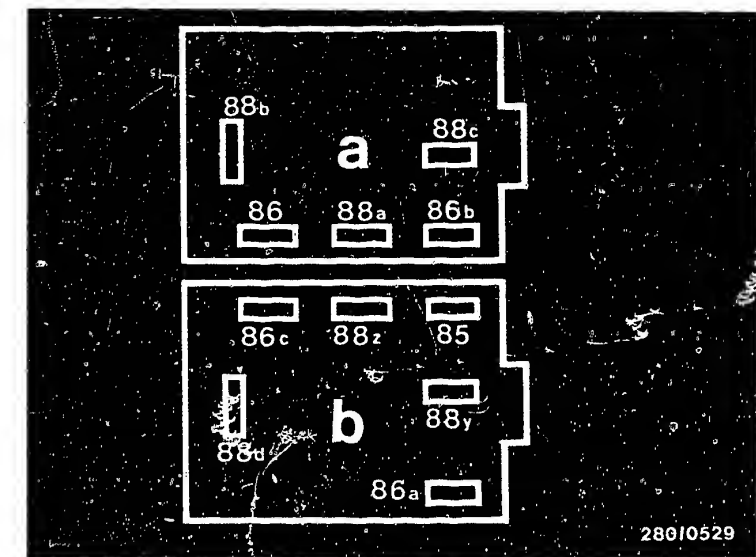
For auxiliary-air device 0 280 140 119:	40...75Ω
For auxiliary-air device 0 280 140 104:	35...70Ω
If incorrect, replace auxiliary-air device.	

7. Test lead 34 from auxiliary-air device to multiple plug term. 34.

Eliminate contact resistances at the plug-in connections.

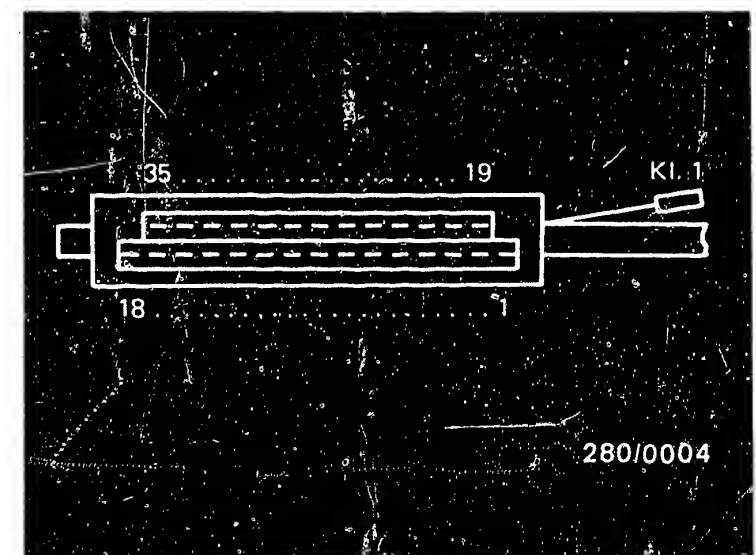
### Installation position of components:

<u>Relay set:</u>	On right in engine compartment near firewall
<u>Control unit:</u>	In passenger compartment, in front passenger footwell at bottom right
<u>Auxiliary-air device:</u>	Front right, on engine block.



View onto connection bases  
(viewed from below)  
Relay set  
a = Jetronic wiring harness  
b = Vehicle wiring harness

Top view of multiple plug



**B 19**

Test chart for universal test adapter  
Opel Commodore, Senator, Monza



**B 20**

Test chart for universal test adapter  
Opel Commodore, Senator, Monza





TEST STEP 3		Reading	Testing
Operation			
Program switch "V" at position:	5	Ignition oscilloscope must indicate ignition pulses	Component: Signal from term. 1
Program switch "Ω" at position:	-		
Measuring equipment: Motortester			
Measuring range: Special input. Control stick as far as it will go to the left and measuring range 20 V		If reading O.K., continue testing with next test step.	Operation: Triggering of control unit by the ignition
Connection: Test wells			Malfunction: No reading
Operation in vehicle: Ignition "ON" and start engine			

### Trouble-shooting:

For all voltage measurements:

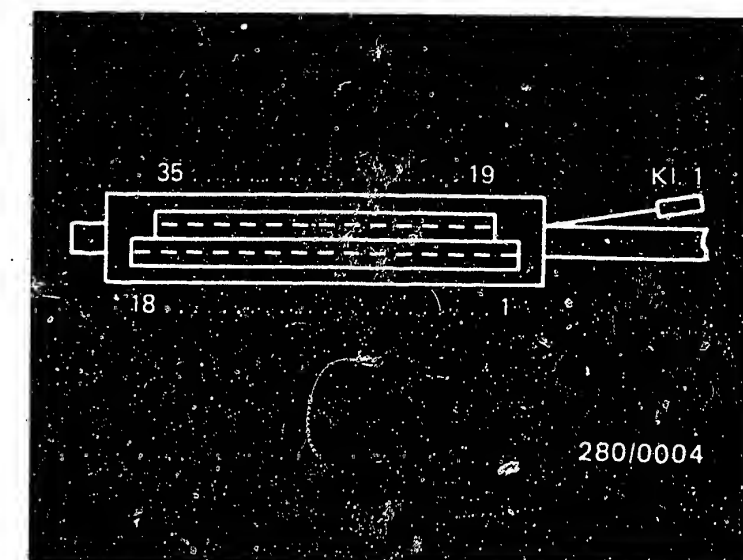
1. Set value 8...15 V (starting)
2. Make measurement at the respective component connector.
3. The connector remains plugged onto the relay set.

For resistance measurements:

For testing, remove the wiring-harness plug from the test adaptor and use the circuit diagram if necessary. Set value approx. 0 Ω.

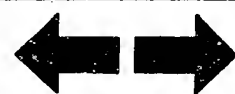
Important! Ignition "OFF" and ensure that good electrical contact is made when measuring.

Continued on B 23



**B21**

Test chart for universal test adaptor  
Opel Commodore, Senator, Monza



**B22**

Test chart for universal test adaptor  
Opel Commodore, Senator, Monza



### Test step 3 (continued)

Lead from multiple plug term. 1 to ignition coil term. 1 dropped off? → Test and, if necessary, repair.

Voltage present at term. 1 ignition coil?

If not, check ignition system. If voltage present, test lead 1 for continuity and for short circuit to ground.

If the lead is O.K., then the trigger stage in the control unit has failed. Replace control unit.

### Installation position of components:

Control unit: In passenger compartment in front passenger footwell at bottom right.

Central ground: On intake manifold at rear, near fire-wall.



Test step 4			
Operation		Reading	Testing
Program switch position "V":	6	Multimeter must indicate 8...15 V.	Component:
Program switch position "Ω":	-		Relay set Voltage supply
Measuring equipment: Multimeter (Voltrange)			Operation:
Measuring range: 0 ... 15 V			Voltage supply
Connection: Test sockets red (positive) and black		If reading O.K., continue testing with next test step.	Malfunction:
Operation in vehicle: Ignition "ON"			No voltage reading

#### Trouble-shooting:

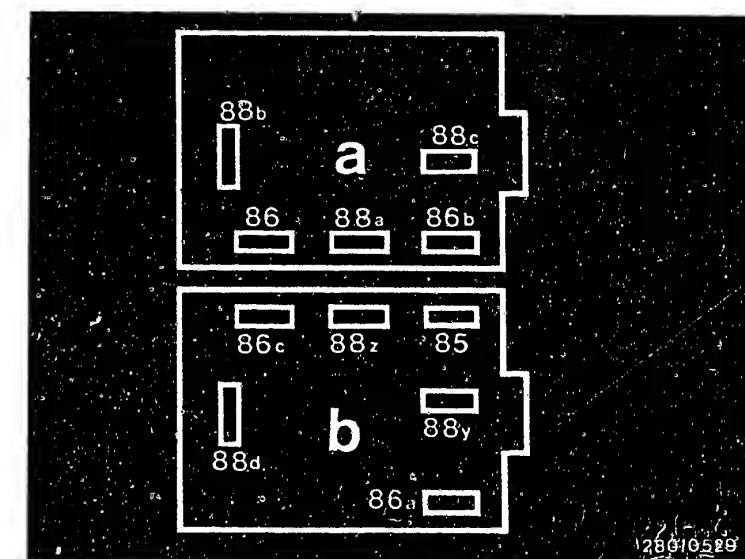
For all voltage measurements:

1. Set value 8...15 V (starting).
2. Make measurement at the respective component connector.
3. The connector remains plugged onto the relay set.

For resistance measurements:

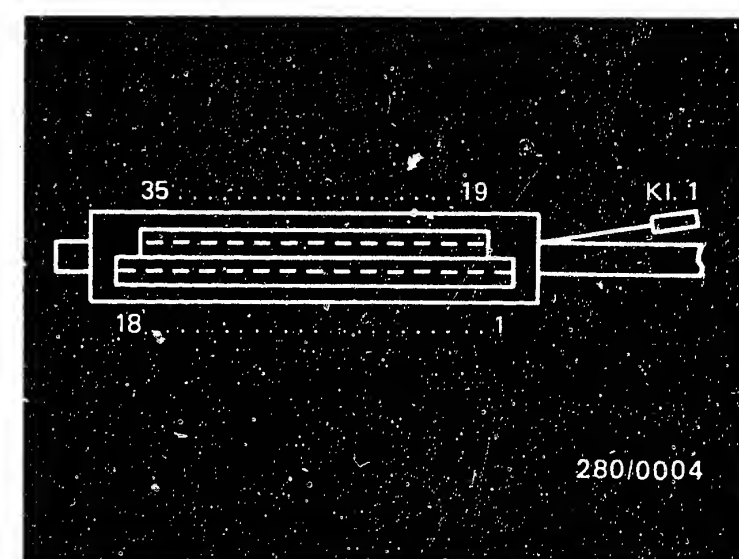
For testing, remove the wiring-harness plug from the test adaptor and use the circuit diagram if necessary. Set value approx. 0Ω.  
Important! Ignition "OFF" and ensure that good electrical contact is made when measuring.

Continued on C 3



Top view of connection base  
(viewed from below)  
a=Jetronic wiring harness  
b=Vehicle wiring harness

Top view of multiple plug



**C1**

Test chart for universal test adaptor  
Opel Commodore, Senator, Monza



**C2**

Test chart for universal test adaptor  
Opel Commodore, Senator, Monza



## Test step 4 (continued)

### Trouble-shooting

1. Voltage at relay set term. 86c? If not, check lead term. 15.
2. Voltage at relay set term. 88z? If not, test lead to battery (positive connection).
3. Voltage at relay set term. 88a? If not, replace relay set.
4. Test lead 10 from relay set term. 88a to multiple plug term. 10 for continuity.

Eliminate contact resistances at the plug-in connections.

### Installation of components:

- Relay set: In engine compartment on firewall, on right-hand side.
- Control unit: In passenger compartment, driver's side, in footwell at bottom right.



Test step 5			
Operation		Reading	Testing
Program switch position "V":	7	Multimeter must indicate  8...15 V.          If reading O.K., continue testing with next test step.	Component:  Control unit Relay set
Program switch position "Ω"	-		Operation:  Voltage supply of 1st solenoid- operated injection valve
Measuring equipment: Multimeter (Volt range)			
Measuring range: 0 ... 15 V			
Connection: Test sockets red (positive) and black			Malfunction:  No voltage reading
Operation in vehicle: Ignition "ON"			

#### Trouble-shooting:

For all voltage measurements:

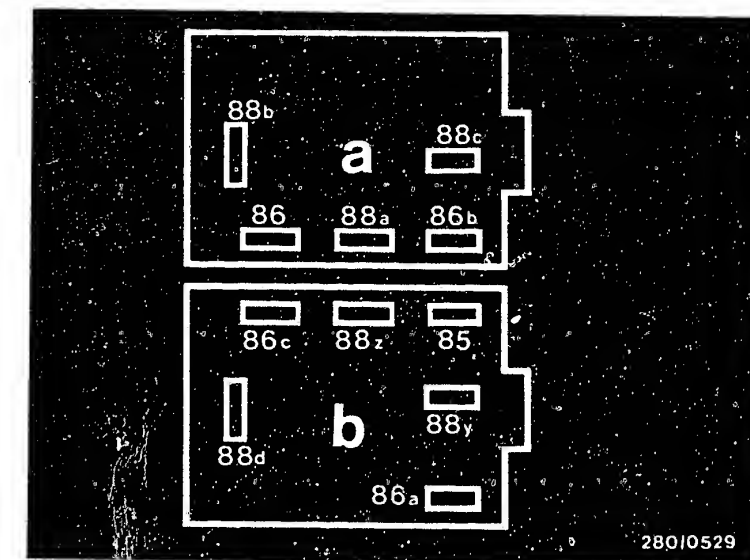
1. Set value 8...15 V (starting).
2. Make measurement at the respective component connector.
3. The connector remains plugged onto the relay set.

For resistance measurements:

For testing, remove the wiring-harness plug from the test adaptor and use the circuit diagram if necessary. Set value approx. 0Ω.

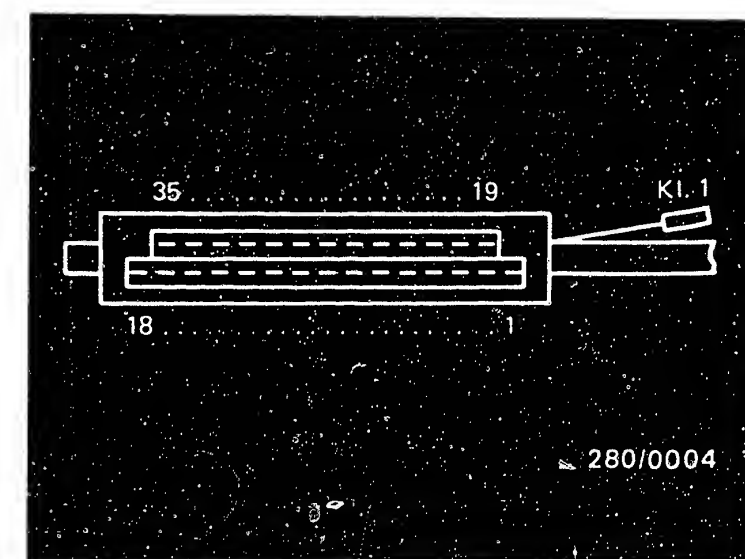
Important! Ignition "OFF" and ensure that good electrical contact is made when measuring.

Continued on C 6



Top view of connection base  
(viewed from below)  
a=Jetronic wiring harness  
b=Vehicle wiring harness

Top view of multiple plug



**C4**

Test chart for universal test adapter  
Opel Commodore, Senator, Monza



**C5**

Test chart for universal test adapter  
Opel Commodore, Senator, Monza



## TEST STEP 5 (continued)

### Trouble-shooting

1. Voltage at relay set term. 88b? If not, replace relay set.

2. Test plug-in connection, connecting leads and series resistors.

Set value of a series resistor: 5...7  $\Omega$

If defective, replace plug-in connection or series resistor.

3. Test plug-in connection at 1st injection valve.

If defective, repair plug-in connection.

4. Voltage at injection valve connector term. 37? If not, test lead from injection valve connector to series resistor.

5. Test for continuity in lead 15 from injection valve connector to multiple plug term. 15.

Eliminate contact resistances at the plug-in connections.

### Installation position of components:

Relay set: On right in engine compartment near firewall.

Control unit: In front passenger footwell at bottom right.

Injection valve: Between engine and intake manifold.



Test step 6			
Operation		Reading	Testing
<u>Program switch position</u> <u>"V":</u>	8	Multimeter must indicate <u>8...15 V.</u>	<u>Component:</u>  Control unit Relay set
<u>Program switch position</u> <u>"Ω"</u>	-		<u>Operation:</u>  Voltage supply of 2nd solenoid- operated injection valve
<u>Measuring equipment:</u> Multimeter (Volt range)			
<u>Measuring range:</u> 0 ... 15 V			
<u>Connection:</u> Test sockets red (positive) and black			
<u>Operation in vehicle:</u> Ignition "ON"		<u>If reading O.K.,</u> continue testing with <u>next test step.</u>	

### Trouble-shooting:

For all voltage measurements:

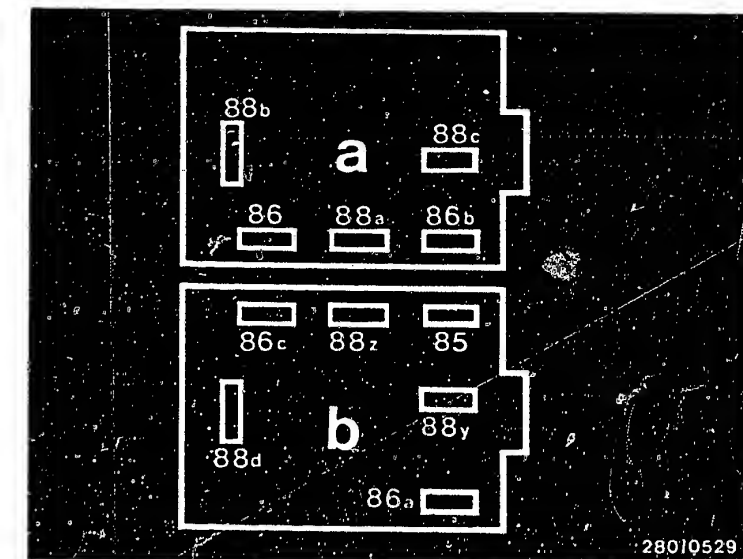
1. Set value 8...15 V (starting).
2. Make measurement at the respective component connector.
3. The connector remains plugged onto the relay set.

For resistance measurements:

For testing, remove the wiring-harness plug from the test adaptor and use the circuit diagram if necessary. Set value approx. 0Ω.

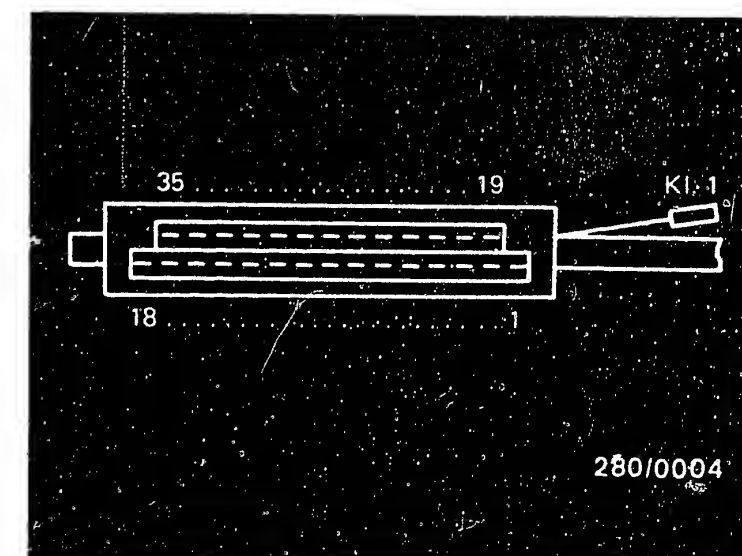
Important! Ignition "OFF" and ensure that good electrical contact is made when measuring.

Continued on C 9



Top view of connection base  
(viewed from below)  
a=Jetronic wiring harness  
b=Vehicle wiring harness

Top view of multiple plug



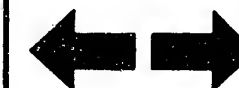
**C7**

Test chart for universal test adapter  
Opel Commodore, Senator, Monza



**C8**

Test chart for universal test adapter  
Opel Commodore, Senator, Monza



## TEST STEP 6 (continued)

### Trouble-shooting

1. Voltage at relay set term. 88 b? If not, replace relay set.
  2. Test plug-in connection, connecting leads and series resistors.  
Set value of a series resistor: 5...7  $\Omega$   
If incorrect, replace plug connector or series resistor.
  3. Test plug connector on injection valve 2. If defective, repair plug connector.
  4. Voltage at injection valve connector term. 38 ? If not, test lead from injection valve connector to series resistor.
  5. Test for continuity in lead 33 from injection valve connector to multiple plug term. 33.
- Eliminate contact resistances at the plug-in connections.

### Installation position of components:

<u>Relay set:</u>	On right in engine compartment near firewall.
<u>Control unit:</u>	In front passenger footwell at bottom right.
<u>Injection valve:</u>	Between engine and intake manifold.





Test step 7			
Operation		Reading	Testing
Program switch position "V":	9	Multimeter must indicate 8...15 V.  If reading O.K., continue testing with next test step.	Component:  Control unit Relay set
Program switch position "Ω":	-		
Measuring equipment: Multimeter (Volt range)			Operation:  Voltage supply of 3rd solenoid- operated injection valve
Measuring range: 0 ... 15 V			
Connection: Test sockets red (positive) and black			Malfunction:  No voltage reading
Operation in vehicle: Ignition "ON"			

#### Trouble-shooting:

For all voltage measurements:

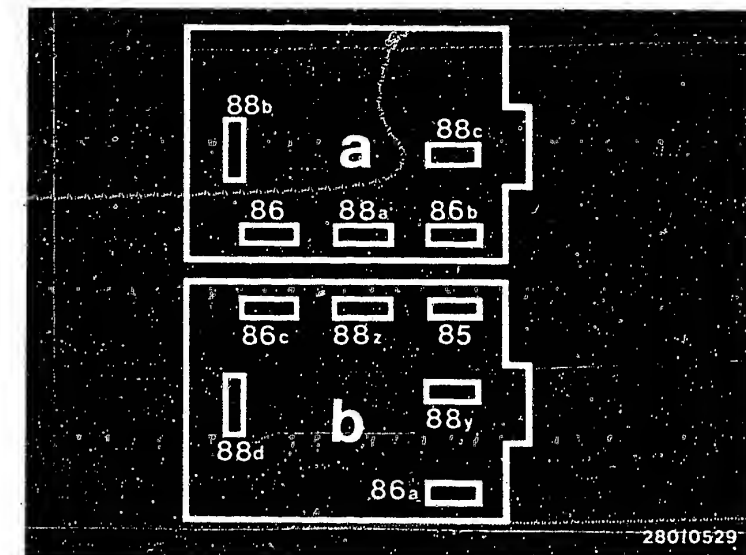
1. Set value 8...15 V (starting).
2. Make measurement at the respective component connector.
3. The connector remains plugged onto the relay set.

For resistance measurements:

For testing, remove the wiring-harness plug from the test adaptor and use the circuit diagram if necessary. Set value approx. 0Ω.

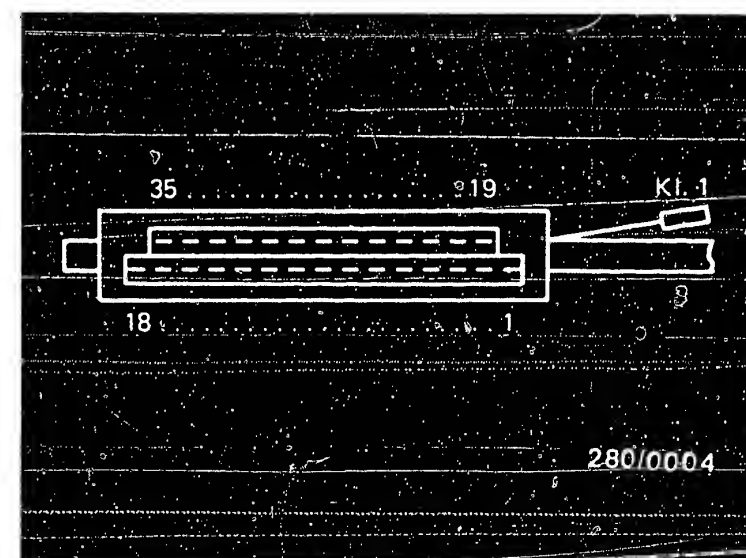
Important! Ignition "OFF" and ensure that good electrical contact is made when measuring.

Continued on C 12



Top view of connection base  
(viewed from below)  
a=Jetronic wiring harness  
b=Vehicle wiring harness

Top view of multiple plug



**C10**

Test chart for universal test adapter  
Opel Commodore, Senator, Monza



**C11**

Test chart for universal test adapter  
Opel Commodore, Senator, Monza



## TEST STEP 7 (continued)

### Trouble-shooting

1. Voltage at relay set term. 88 b? If not, replace relay set.
  2. Test plug-in connection, connecting leads and series resistors.  
Set value of a series resistor: 5...7  $\Omega$   
If incorrect, replace plug connector or series resistor.
  3. Test plug connector on injection valve 3. If defective, repair plug connector.
  4. Voltage at injection valve connector term.40 ? If not, test lead from injection valve connector to series resistor.
  5. Test for continuity in lead 32 from injection valve connector to multiple plug term.32 .
- Eliminate contact resistances at the plug-in connections.

### Installation position of components:

<u>Relay set:</u>	On right in engine compartment near firewall.
<u>Control unit:</u>	In front passenger footwell at bottom right.
<u>Injection valve:</u>	Between engine and intake manifold.



Test step 8			
Operation		Reading	Testing
Program switch position "V":	10	Multimeter must indicate  8...15 V.         If reading O.K., continue testing with next test step.	<u>Component:</u>  Control unit Relay set
Program switch position "Ω":	—		
<u>Measuring equipment:</u> Multimeter (Volt range)			<u>Operation:</u>  Voltage supply of 4th solenoid- operated injection valve
<u>Measuring range:</u> 0 ... 15 V			
<u>Connection:</u> Test sockets red (positive) and black			
<u>Operation in vehicle:</u> Ignition "ON"			<u>Malfunction:</u>  No voltage reading

### Trouble-shooting:

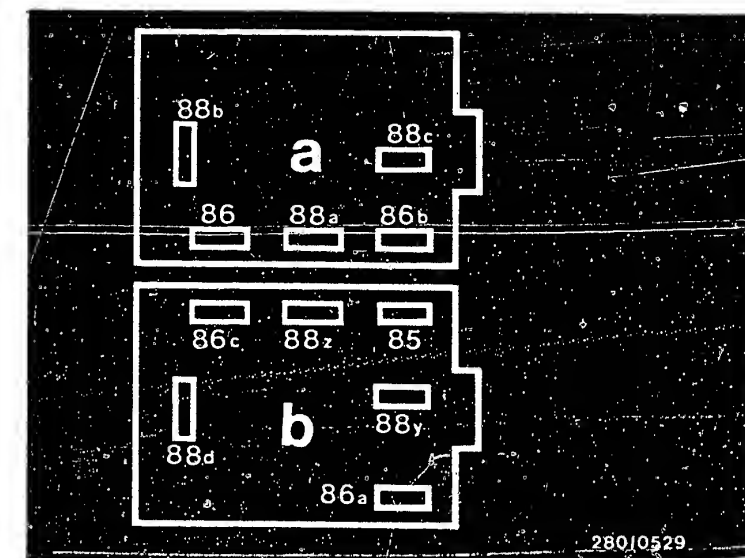
#### For all voltage measurements:

1. Set value 8...15 V (starting).
2. Make measurement at the respective component connector.
3. The connector remains plugged onto the relay set.

#### For resistance measurements:

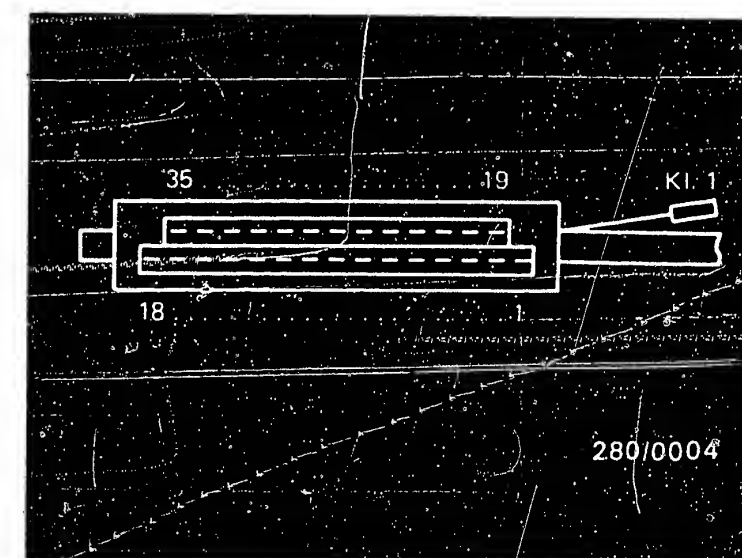
For testing, remove the wiring-harness plug from the test adaptor and use the circuit diagram if necessary. Set value approx. 0Ω  
Important! Ignition "OFF" and ensure that good electrical contact is made when measuring.

Continued on C 15



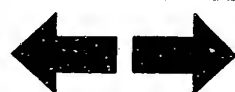
Top view of connection bas  
(viewed from below)  
a=Jetronic wiring harness  
b=Vehicle wiring harness

Top view of multiple plug



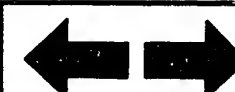
**C13**

Test chart for universal test adapter  
Opel Commodore, Senator, Monza



**C14**

Test chart for universal test adapter  
Opel Commodore, Senator, Monza



## TEST STEP 8 (continued)

### Trouble-shooting

1. Voltage at relay set term. 88 b? If not, replace relay set.
2. Test plug-in connection, connecting leads and series resistors.  
Set value of a series resistor: 5...7  $\Omega$   
If incorrect, replace plug connector or series resistor.
3. Test plug connector on injection valve 4. If defective, repair plug connector.
4. Voltage at injection valve connector term. 41? If not, test lead from injection valve connector to series resistor.
5. Test for continuity in lead 14 from injection valve connector to multiple plug term. 14.

Eliminate contact resistances at the plug-in connections.

### Installation position of components:

<u>Relay set:</u>	On right in engine compartment near firewall.
<u>Control unit:</u>	In front passenger footwell at bottom right.
<u>Injection valve:</u>	Between engine and intake manifold.



Test step 9			
Operation		Reading	Testing
Program switch position "V":	11	Multimeter must indicate  8...15 V.          If reading O.K., continue testing with next test step.	<u>Component:</u>  Pump contact in air-flow sensor Relay set
Program switch position "Ω":	-		
Measuring equipment: Multimeter (Volt range)			
Measuring range: 0...15 V			
Connection: Test sockets red (positive) and black			
Operation in vehicle: Ignition "ON" Deflect air-flow sensor flap.			<u>Malfunction:</u>  No voltage reading

#### Trouble-shooting:

For all voltage measurements:

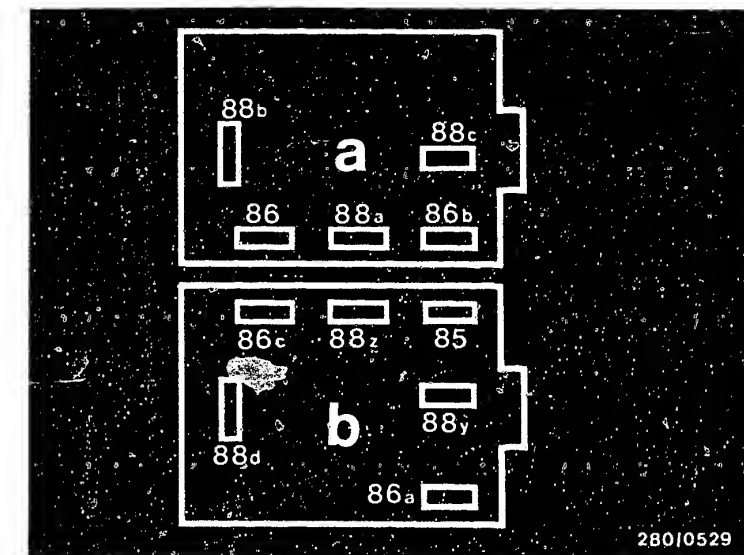
1. Set value 8...15 V (starting).
2. Make measurement at the respective component connector.
3. The connector remains plugged onto the relay set.

For resistance measurements:

For testing, remove the wiring-harness plug from the test adaptor and use the circuit diagram if necessary. Set value approx. 0Ω.

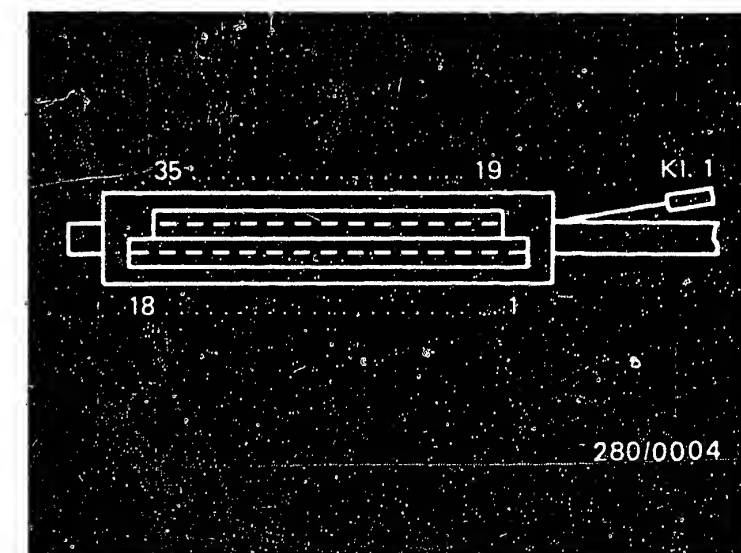
Important! Ignition "OFF" and ensure that good electrical contact is made when measuring.

Continued on C 18



Top view of connection base  
(viewed from below)  
a=Jetronic wiring harness  
b=Vehicle wiring harness

Top view of multiple plug



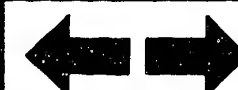
**C16**

Test chart for universal test adaptor  
Opel Commodore, Senator, Monza



**C17**

Test chart for universal test adaptor  
Opel Commodore, Senator, Monza



## TEST STEP 9 (continued)

### Trouble-shooting

1. Voltage at air-flow sensor term. 39?

If not, remove plug from air-flow sensor and test lead 39.

2. Test pump contact in air-flow sensor. Deflect air-flow sensor flap. Remove hose between air filter and air-flow sensor. Test diode in air-flow sensor (as of FD 051) between term. 6 and term. 36 (positive pole of ohmmeter to term. 6 of air-flow sensor). Set value: approx. 0  $\Omega$  (with reversed polarity  $\infty \Omega$ ).

3. Test lead 36 between air-flow sensor and relay set.

4. Test lead 20 between control unit and relay set..

Eliminate contact resistances in the plug-in connections.  
Caution!

After testing is completed, refit the hose between air filter and air-flow sensor. Tighten the hose clamp securely. Check for leaks.

### Installation position of components

Control unit

In front passenger footwell at bottom.

Air-flow sensor:

In engine compartment at front right.

Relay set:

On right in engine compartment, near firewall.



Test step 10			
Operation		Reading	Testing
<u>Program switch position</u> "V":	13	Multimeter must indicate <u>8...15 V.</u>  If reading O.K., continue testing with <u>next test step.</u>	<u>Component:</u>  Control unit Relay set
<u>Program switch position</u> "Ω":	—		
<u>Measuring equipment:</u> Multimeter (Volt range)			<u>Operation:</u>  Voltage supply of 5th solenoid- operated injection valve
<u>Measuring range:</u> 0 ... 15 V			
<u>Connection:</u> Test sockets red (positive) and black			<u>Malfunction:</u>  No voltage reading
<u>Operation in vehicle:</u> Ignition "ON"			

### Trouble-shooting:

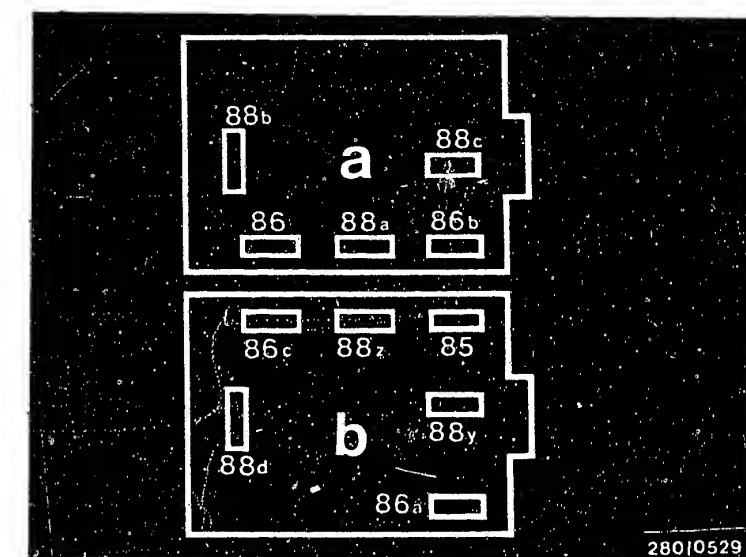
#### For all voltage measurements:

1. Set value 8...15 V (starting).
2. Make measurement at the respective component connector.
3. The connector remains plugged onto the relay set.

#### For resistance measurements:

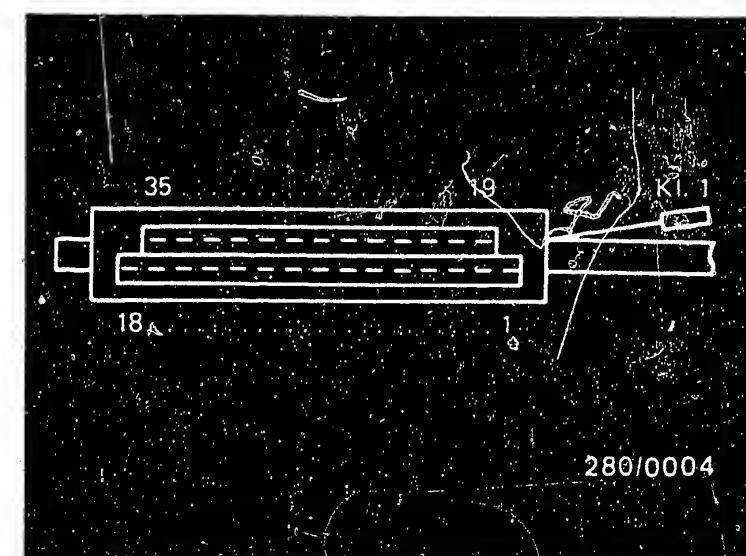
For testing, remove the wiring-harness plug from the test adaptor and use the circuit diagram if necessary. Set value approx. 0Ω  
Important! Ignition "OFF" and ensure that good electrical contact is made when measuring.

Continued on C 21



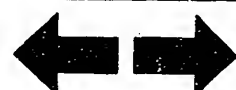
Top view of connection base  
(viewed from below)  
a=Jetronic wiring harness  
b=Vehicle wiring harness

Top view of multiple plug



**C19**

Test chart for universal test adapter  
Opel Commodore, Senator, Monza



**C20**

Test chart for universal adapter  
Opel Commodore, Senator, Monza



## TEST STEP 10 (continued)

### Trouble-shooting

1. Voltage at relay set term. 88 b? If not, replace relay set.
2. Test plug-in connection, connecting leads and series resistors.  
Set value of a series resistor:  $5...7\ \Omega$   
If incorrect, replace plug connector or series resistor.
3. Test plug connector on injection valve 5. If defective, repair plug connector.
4. Voltage at injection valve connector term. 55? If not, test lead from injection valve connector to series resistor.
5. Test for continuity in lead 30 from injection valve connector to multiple plug term. 30.

Eliminate contact resistances at the plug-in connections.

### Installation position of components:

<u>Relay set:</u>	On right in engine compartment near firewall.
<u>Control unit:</u>	In front passenger footwell at bottom right.
<u>Injection valve:</u>	Between engine and intake manifold.





Test step 11			
Operation		Reading	Testing
<u>Program switch position</u> "V":	14	Multimeter must indicate  <u>8...15 V.</u>          If reading O.K., continue testing with <u>next test step.</u>	<u>Component:</u>  Control unit Relay set
<u>Program switch position</u> "Ω":	—		<u>Operation:</u>  Voltage supply of 6th solenoid- operated injection valve
<u>Measuring equipment:</u> Multimeter (Volt range)			
<u>Measuring range:</u> 0 ... 15 V			
<u>Connection:</u> Test sockets red (positive) and black			
<u>Operation in vehicle:</u> Ignition "ON"			<u>Malfunction:</u>  No voltage reading

### Trouble-shooting:

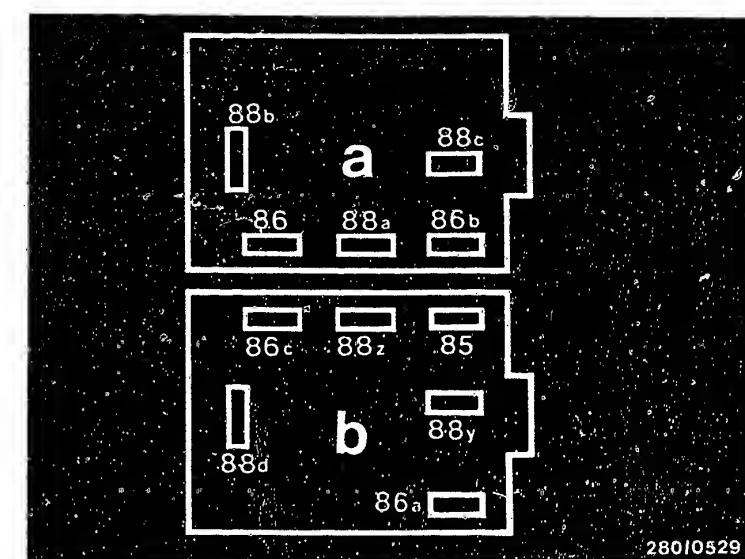
For all voltage measurements:

1. Set value 8...15 V (starting).
2. Make measurement at the respective component connector.
3. The connector remains plugged onto the relay set.

For resistance measurements:

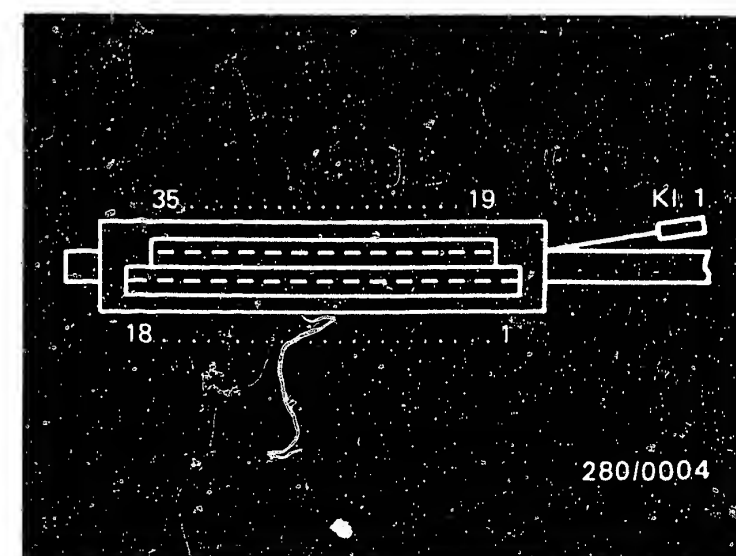
For testing, remove the wiring-harness plug from the test adaptor and use the circuit diagram if necessary. Set value approx. 0Ω  
Important! Ignition "OFF" and ensure that good electrical contact is made when measuring.

Continued on C 24



Top view of connection base  
(viewed from below)  
a=Jetronic wiring harness  
b=Vehicle wiring harness

Top view of multiple plug



**C22**

Test chart for universal test adapter  
Opel Commodore, Senator, Monza



**C23**

Test chart for universal test adapter  
Opel Commodore, Senator, Monza



## TEST STEP 11 (continued)

### Trouble-shooting

1. Voltage at relay set term. 88b? If not, replace relay set.

2. Test plug-in connection, connecting leads and series resistors.

Set value of a series resistor:  $5...7\Omega$

If defective, replace plug-in connection or series resistor.

3. Test plug-in connection at 6th injection valve.  
If defective, repair plug-in connection.

4. Voltage at injection valve connector term. 56? If not, test lead from injection valve connector to series resistor.

5. Test for continuity in lead 31 from injection valve connector to multiple plug term. 31.

Eliminate contact resistances at the plug-in connections.

### Installation position of components:

Relay set: On right in engine compartment near firewall.

Control unit: In front passenger footwell at bottom right.

Injection valve: Between engine and intake manifold.



Test step 12			
Operation		Reading	Testing
Program switch "V" at position:	↓	Multimeter must indicate	<u>Component:</u>  Air-flow sensor (Potentiometer)
Program switch "Ω" at position:	6	<u>40...300 Ω</u>  for air-flow sensor 0 280 202 007	<u>Operation:</u>  Resistance between air-flow sensor term. 7 and central ground.
Measuring equipment: Multimeter (Ω range)		and	
Measuring range: x 10 Ω		<u>80...600 Ω</u>  for air-flow sensor 0 280 202 007,...024 (as of FD 147).	
Connection: Test sockets blue		If reading O.K.; continue testing with <u>next test step.</u>	<u>Malfunction:</u>  Resistance outside tolerance
Operation in vehicle: Deflect air-flow sensor flap as far as it will go.			

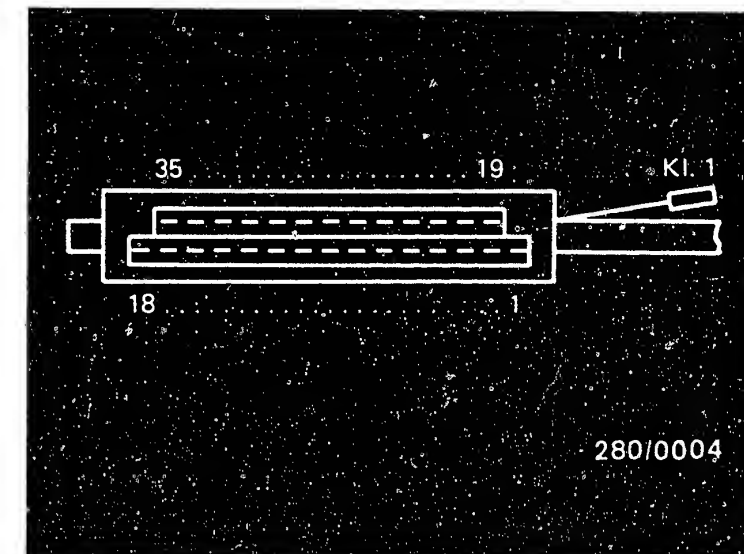
#### Trouble-shooting:

For testing, remove the wiring-harness plug from the test adaptor and use the circuit diagram if necessary.

Using ohmmeter, test the following leads for continuity (set value approx. 0Ω):

- From multiple plug term. 7 to air-flow sensor term. 7
- From air-flow sensor term. 6 to multiple plug term. 6
- From multiple plug term. 5 to central ground.

Eliminate contact resistances in the plug-in connections.



Top view of multiple plug

#### Installation position of components

Air-flow sensor: In engine compartment at front right.

Central ground: On intake manifold on right, near firewall.

Realy set: Near firewall on right.

Control unit: On driver's side, in footwell at bottom right.

**D1**

Test chart for universal test adapter  
Opel Commodore, Senator, Monza

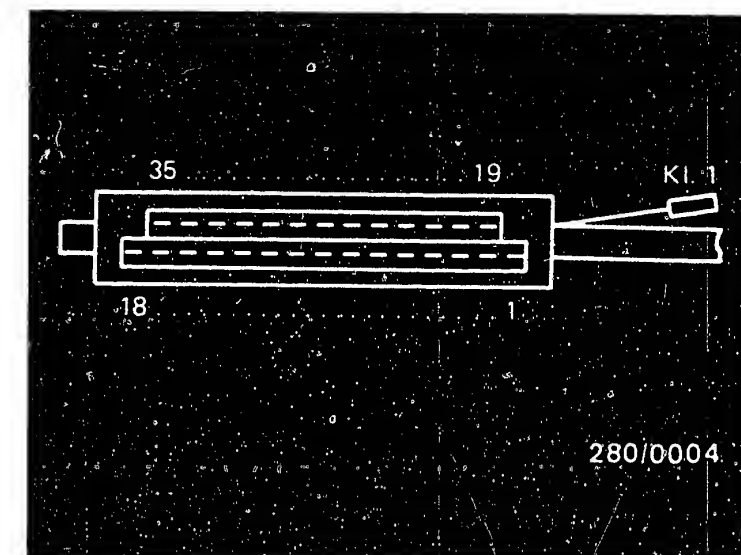


**D2**

Test chart for universal test adapter  
Opel Commodore, Senator, Monza



Test step 13		
Operation		Reading
Program switch "V" at position:	↓	Multimeter must indicate $130 \dots 260 \Omega$ for air-flow sensor 0 280 202 007 and $260 \dots 520 \Omega$ for air-flow sensor 0 280 202 007, 024 (as of FD 147). If reading O.K., continue testing with next test step.
Program switch "Ω" at position:	7	
Measuring equipment: Multimeter (Ω range)		
Measuring range: x 10 Ω		
Connection: Test sockets blue		
Operation in vehicle:		
		Testing
		<u>Component:</u> Air-flow sensor
		<u>Operation:</u> Resistance between air-flow sensor term. 8 and central ground.
		<u>Malfunction:</u> Resistance outside tolerance



Top view of multiple plug

### Trouble-shooting:

For testing, remove the wiring-harness plug from the test adaptor and use the circuit diagram if necessary.

Using ohmmeter, test the following leads for continuity (set value approx. 0 Ω):

#### Air-flow sensor

- From multiple plug term. 8 to air-flow sensor term. 8
  - From air-flow sensor term. 6 to multiple plug term. 6
  - From multiple plug term. 5 to central ground.
- Eliminate contact resistances in the plug-in connections.

### Installation position of components

Control unit: In front passenger footwell at bottom right.

Air-flow sensor: In engine compartment at front right.

Central ground: On intake manifold at rear, near firewall.

**D3**

Test chart for universal test adaptor  
Opel Commodore, Senator, Monza



**D4**

Test chart for universal test adaptor  
Opel Commodore, Senator, Monza



Test step 14		
Operation:		Reading
Program switch "V" at position:	↓	Multimeter must indicate 200...400Ω for air-flow sensor 0 280 202 007. and 400...800 Ω for air-flow sensor 0 280 202 007 (as of FD 141) and ... 024.  If reading O.K., continue testing with next test step.
Program switch "Ω" at position:	8	
Measuring equipment: Multimeter (Ω range)		
Measuring range: x 10 Ω		
Connection: Test sockets blue		
Operation in vehicle: -		Testing
		Component: Air-flow sensor
		Operation: Resistance between air-flow sensor term. 9 and central ground.
		Malfunction: Resistance outside tolerance

#### Trouble-shooting:

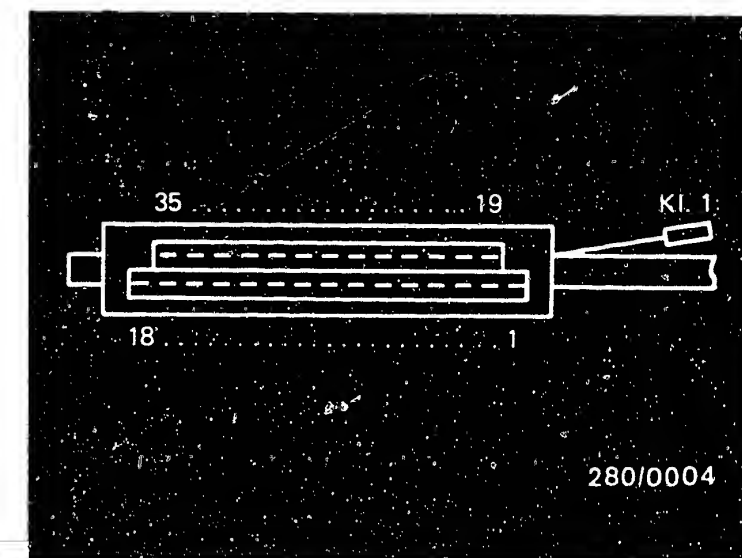
For testing, remove the wiring-harness plug from the test adaptor and use the circuit diagram if necessary.

Using ohmmeter, test the following leads for continuity (set value approx. 0Ω):

#### Air-flow sensor:

- From multiple plug term. 9 to air-flow sensor term. 9
- From air-flow sensor term. 6 to multiple plug term. 6
- From multiple plug term. 5 to central ground.

Eliminate contact resistances in the plug-in connections.



Top view of multiple plug

#### Installation position of components

Control unit: In front passenger footwell at bottom right.

Air-flow sensor: In engine compartment at front right.

Central ground: On intake manifold at rear, near firewall.

**D5**

Test chart for universal test adapter  
Opel Commodore, Senator, Monza



**D6**

Test chart for universal test adapter  
Opel Commodore, Senator, Monza



Test step 15			
Operation		Reading	Testing
Program switch "V" at position:	↓	Multimeter must 0...10Ω  indicate   If reading O.K., continue testing with next test step.	Component: Throttle-valve switch (Idle contact)
Program switch "Ω" at position:	9		Operation: Resistance between throttle- valve switch term. 2 and term. 18
Measuring equipment: Multimeter (Ω range)			Malfunction: Resistance outside tolerance
Measuring range: x 1 Ω			
Connection: Test sockets blue			
Operation in vehicle: Accelerator in rest position			

#### Trouble-shooting:

For testing, remove the wiring-harness plug from the test adaptor and use the circuit diagram if necessary.

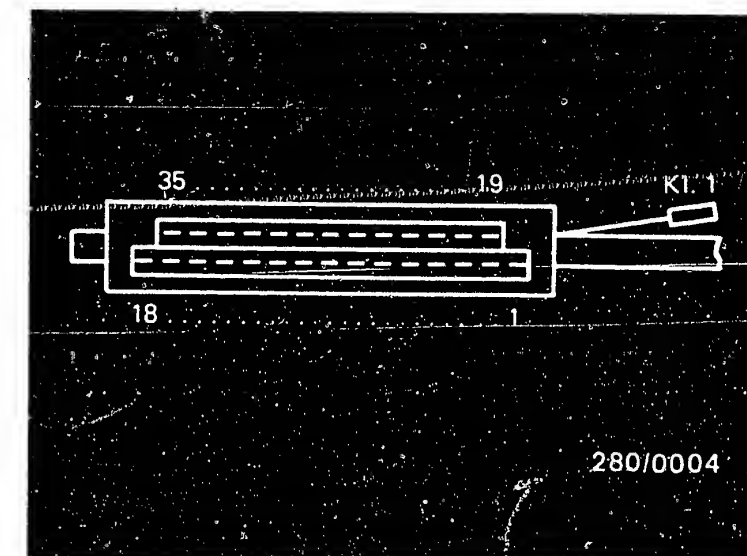
Throttle-valve closed? Check whether the throttle valve can be closed still further and whether the engine speed thereby drops.

Adjustment: The throttle valve must be set to just before it sticks with the throttle-valve stop screw. Straighten throttle linkage if bent. Does the throttle valve open fully? Throttle linkage, accelerator pedal O.K.? If necessary, straighten linkage. Throttle linkage may stick due to floor mat etc.

Fault still present?

Using ohmmeter, test the following leads for continuity (set value approx 0Ω):

- From multiple plug term. 2 to throttle-valve switch term. 2
  - From throttle-valve switch term. 18 to multiple plug term. 18
- Eliminate contact resistances in the plug-in connections.



Top view of multiple plug

#### Installation position of components

Throttle-valve switch:

On intake manifold on right

Control unit:

On front passenger side, in footwell  
on bottom right

**D7**

Test chart for universal test adapter  
Opel Commodore, Senator, Monza



**D8**

Test chart for universal test adapter  
Opel Commodore, Senator, Monza



Test step 16			
Operation		Reading	Testing
Program switch "Ω" at position:	↓	Multimeter must 0...10Ω  indicate	<u>Component:</u>  Throttle-valve switch (Full-load contact)
Program switch "V" at position:	10		
Measuring equipment: Multimeter (Ω range)			If reading O.K., continue testing with <u>next test step.</u>
Measuring range: x 1 Ω.		<u>Malfunction:</u>  Resistance outside tolerance	
Connection: Test sockets blue			
Operation in vehicle: Accelerator in full-load position			

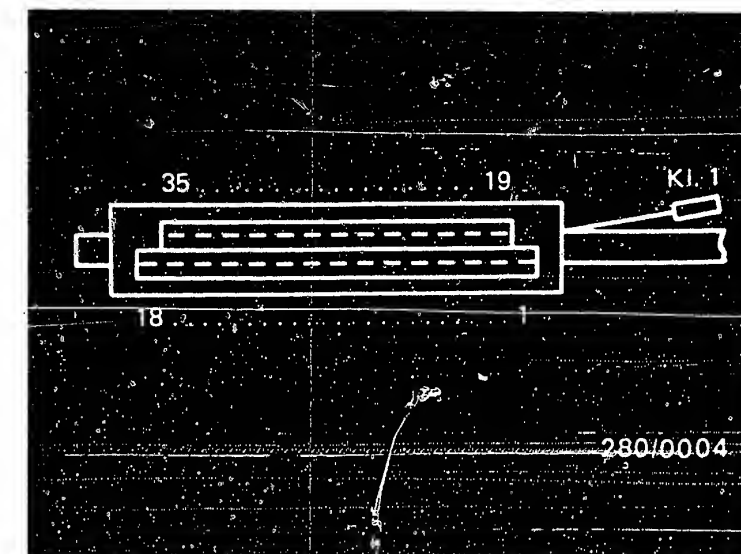
#### Trouble-shooting:

For testing, remove the wiring-harness plug from the test adaptor and use the circuit diagram if necessary.

Using ohmmeter, test the following leads for continuity (set value approx. 0Ω):

- From multiple plug term. 3 to throttle-valve switch term. 3
- From throttle-valve switch term. 18 to multiple plug term. 18.

Eliminate contact resistances in the plug-in connections.



Top view of multiple plug

#### Installation position of components

Throttle-valve switch:  
On intake manifold on right

Control unit:  
On front passenger side, in footwell  
on bottom right

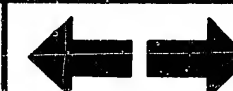
**D9**

Test chart for universal test adapter  
Opel Commodore, Senator, Monza



**D10**

Test chart for universal test adapter  
Opel Commodore, Senator, Monza





Test step 17		
Operation	Reading	Testing
Program switch "V" at position:	<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;">↓</div> <div style="text-align: center;"> <b>1</b> </div> </div>	<u>Component:</u>  Temperature sensor I (intake air)
Program switch "Ω" at position:		
Measuring equipment: Multimeter (Ω range)		<u>Operation:</u> Resistance on air-flow sensor between term. 27 and term. 6
Measuring range: x 10 Ω or x 100 Ω		
Connection: Test sockets blue	indicate.     If reading O.K., continue testing with next test step.	<u>Malfunction:</u> Resistance outside tolerance
Operation in vehicle:		

#### Trouble-shooting:

For testing, remove the wiring-harness plug from the test adaptor and use the circuit diagram if necessary.

Measure resistance directly at temperature sensor I (intake air) in air-flow sensor.

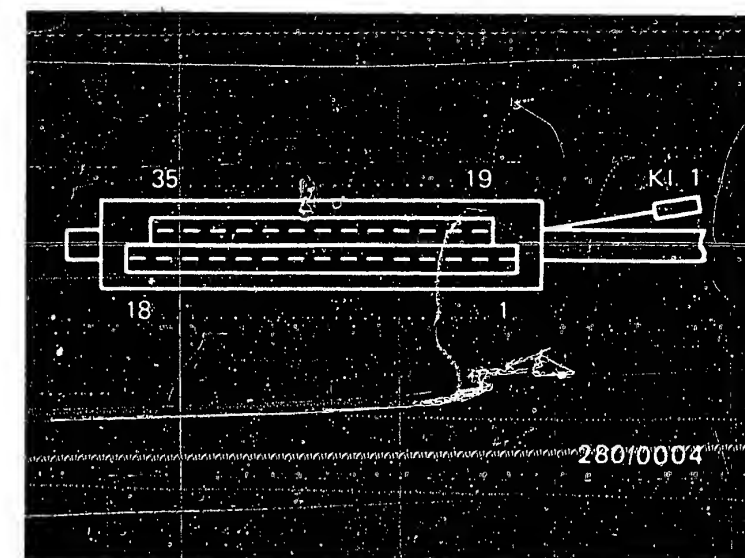
At ambient temperature (approx. 15-30° C): 1.45 ... 3.3 kΩ

Engine at normal operating temperature (approx 80° C): 280 ... 360 kΩ

Using ohmmeter, test the following leads for continuity (set value approx. 0Ω):

- From multiple plug term. 27 to air-flow sensor term. 27
- From air-flow sensor term. 6 to multiple plug term. 6
- From multiple plug term. 5 to central ground.

Eliminate contact resistances in the plug-in connections.



Top view of multiple plug

#### Installation position of components

Control unit: On front passenger side, in footwell at bottom right  
 Air-flow sensor: On right between air filter and intake manifold  
 Central ground: On intake manifold at rear, near start valve and firewall.

**D11**

Test chart for universal test adapter  
Opel Commodore, Senator, Monza




**D12**

Test chart for universal test adapter  
Opel Commodore, Senator, Monza





Test step 18			
Operation		Reading	Testing
<u>Program switch "V"</u> at position:		Multimeter must <u>30 Ω ... 30 kΩ</u>  (depends on temperature)  indicate.	<u>Component:</u> Temperature sensor II (engine)
<u>Program switch "Ω"</u> at position:	12		
<u>Measuring equipment:</u> Multimeter ( Ω range)			<u>Operation:</u> Resistance between control unit term. 13 and central ground
<u>Measuring range:</u> x 10 Ω or x 100 Ω			
<u>Connection:</u> Test sockets blue		If reading O.K., continue testing with <u>next test step.</u>	<u>Malfunction:</u> Resistance outside tolerance
<u>Operation in vehicle:</u> -			

#### Trouble-shooting:

For testing, remove the wiring-harness plug from the test adaptor and use the circuit diagram if necessary.

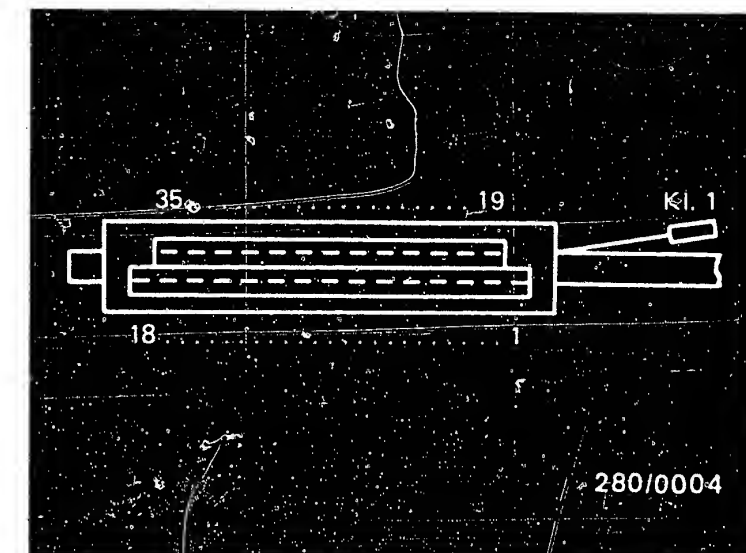
Measure resistance directly at temperature sensor II (engine).

At ambient temperature (approx. 15-30°C): 1.45 ... 3.3 k $\Omega$

Engine at normal operating temperature (approx 80°C): 280 ... 360 k $\Omega$

Test the following leads for continuity using ohmmeter  
(Set value approx. 0 $\Omega$ )

- From multiple plug term. 13 to temperature sensor II (engine) term. 13.
  - Lead 49 from temperature sensor II to central ground.
- Eliminate contact resistances in the plug-in connections.



Top view of multiple plug

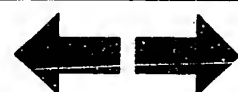
#### Installation position of components

Control unit: On front passenger side, in footwell at bottom right  
 Air-flow sensor: On right between air filter and intake manifold  
 Central ground: On intake manifold at rear, near start valve and firewall.

**D13**

Test chart for universal test adaptor

Opel Commodore, Senator, Monza



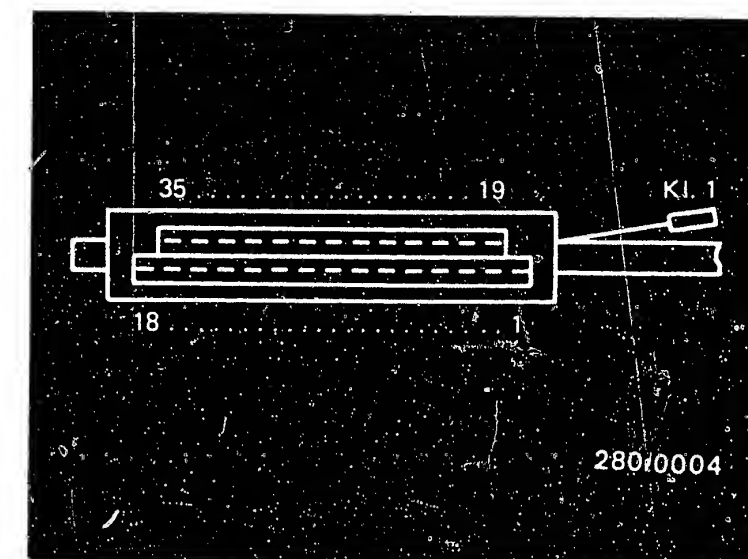
**D14**

Test chart for universal test adaptor

Opel Commodore, Senator, Monza



Test step 19		
Operation		Reading
Program switch "V" at position:	↓	Multimeter must 0 ... 10Ω  indicate.
Program switch "Ω" at position:	13	
Measuring equipment: Multimeter (Ω range)		
Measuring range: x 1Ω		If reading O.K., continue testing with next test step.
Connection: Test sockets blue		
Operation in vehicle: -		
		Testing
		Component: Ground connection of output stage
		Operation: Ground connection of control unit.
		Malfunction: Resistance outside tolerance



Top view of multiple plug

#### Trouble-shooting:

For testing, remove the wiring-harness plug from the test adaptor and use the circuit diagram if necessary.

Using ohmmeter, test the following leads for continuity (set value approx. 0Ω):

- From multiple plug term. 16 to central ground.
- From multiple plug term. 5 to central ground.

Eliminate contact resistances at the plug-in connections.

#### Installation position of components

Central ground: On intake manifold at rear, near firewall.

Control unit: In front passenger footwell at bottom right.

**D15**

Test chart for universal test adapter  
Opel Commodore, Senator, Monza



**D16**

Test chart for universal test adapter  
Opel Commodore, Senator, Monza



Test step 20			
Operation		Reading	Testing
Program switch position "V":	↓	Multimeter must 0 ... 10Ω indicate.	Component: Ground connection of output stage
Program switch position "Ω":	14		
Measuring equipment: Multimeter (Ω range)		If reading O.K. continue testing with next test step.	Operation: Ground connection of control unit
Measuring range: x 1 Ω			
Connection: Test sockets blue			Malfunction: Resistance outside tolerance
Operation in vehicle: -			

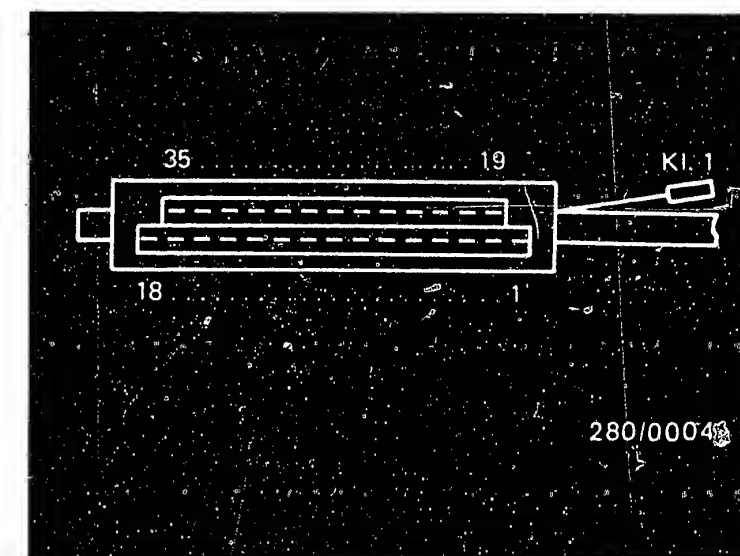
#### Trouble-shooting:

For testing, remove the wiring-harness plug from the test adaptor and use the circuit diagram if necessary.

Using ohmmeter, test the following leads for continuity (set value approx. 0Ω):

- From multiple plug term. 17 to ground terminal.
- From multiple plug term. 5 to ground terminal.

Eliminate contact resistances at the plug-in connections.



Top view of multiple plug

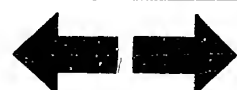
#### Installation position of components

Central ground: On intake manifold at rear, near firewall.

Control unit: In front passenger footwell at bottom right.

**D17**

Test chart for universal test adapter  
Opel Commodore, Senator, Monza



**D18**

Test chart for universal test adapter  
Opel Commodore, Senator, Monza



Test step 21			
Operation		Reading	Testing
Program switch position "V":	↓	Multimeter must 0 ... 10Ω  indicate.	Component:  Ground connection of output stage
Program switch position "Ω":	15		
Measuring equipment: Multimeter (Ω range)		If reading O.K., continue testing with next test step.	Operation:  Ground connection of control unit
Measuring range: x 1 Ω			
Connection: Test sockets blue			Malfunction:  Resistance outside tolerance
Operation in vehicle: -			

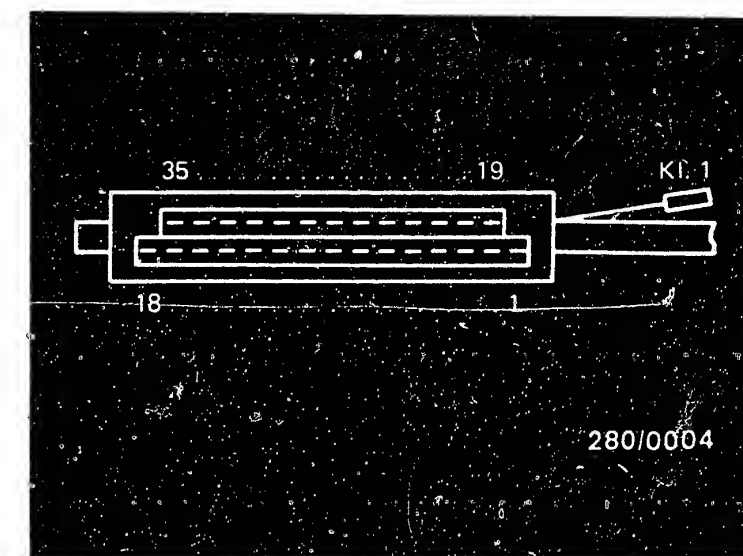
#### Trouble-shooting:

For testing, remove the wiring-harness plug from the test adaptor and use the circuit diagram if necessary.

Using ohmmeter, test the following leads for continuity (set value approx. 0Ω):

- From multiple plug term. 35 to ground terminal.
- From multiple plug term. 5 to ground terminal.

Eliminate contact resistances at the plug-in connections.



Top view of multiple plug

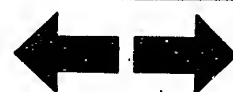
#### Installation position of components

Central ground: On intake manifold at rear, near firewall.

Control unit: In front passenger footwell at bottom right.

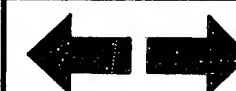
**D 19**

Test chart for universal test adaptor  
Opel Commodore, Senator, Monza



**D 20**

Test chart for universal test adaptor  
Opel Commodore, Senator, Monza



The test with the universal test adapter is now completed. The fuel pressure test must now be performed. If a fault is found during a test, the test must be repeated after the fault has been remedied.

**D21**

Test chart for universal test adapter  
Opel Commodore, Senator, Monza



# FUEL PRESSURE TEST

Fuel pump operating? (listen)  
Relay set O.K.?

No

Yes

1. Test relay set.  
For testing, screw off relay set and turn round so that connection bases are accessible from below.

Test voltage supply.

Switch on ignition. Using voltmeter, measure battery voltage at term. 88z, 88b, 88e and 88a to vehicle ground. If no voltage, test connecting leads. Lead O.K.? If yes →

2. Test resistance at relay set between term. 88b (connection of positive pole) and term 85.

With relay set 0 332 514 107:

50...110 Ω

With relay set 0 332 514 124:

70...500 Ω

O.K.? If yes →

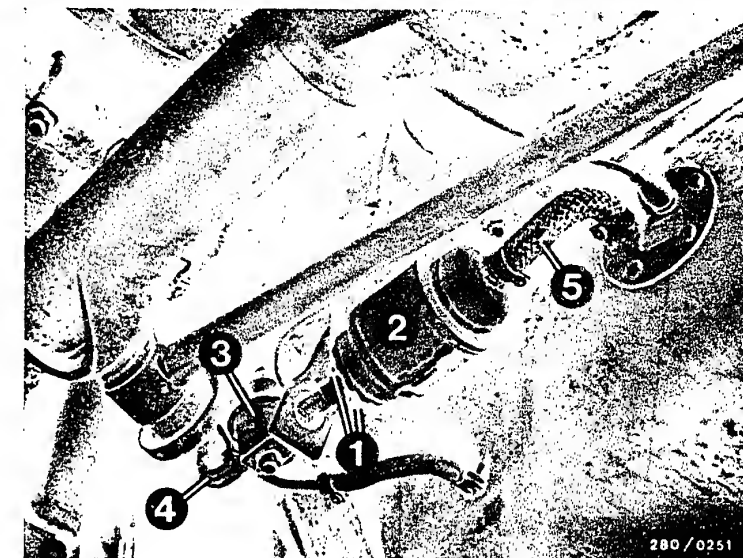
3. Start engine. Test voltage at disconnected pump plug (set value min. 12 V). If no voltage: Test voltage at pump fuse and relay set term. 88y and 88c.

The pump fuse is in the fuse box.

Voltage at term. 88y → replace pump fuse.

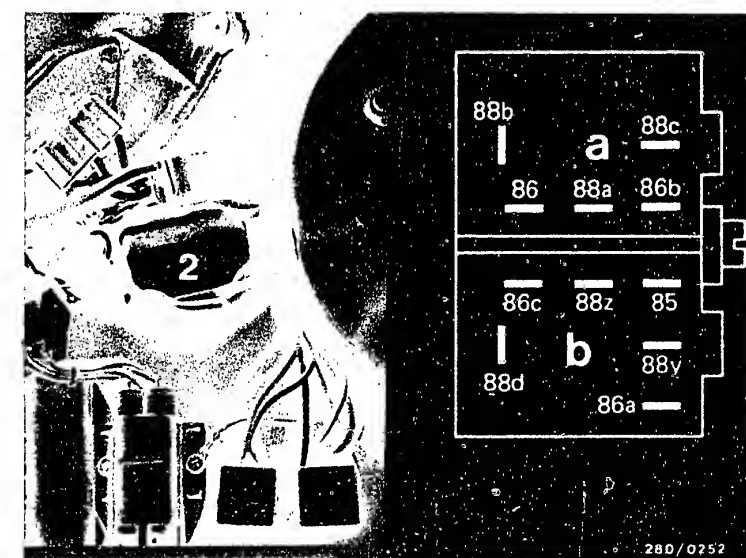
No voltage at term. 88d → replace relay set.

Continued on E 3/ E 4



- 1 = Electrical connections
- 2 = Electric fuel pump
- 3 = Fuel pressure damper
- 4 = Fuel delivery line
- 5 = Fuel intake line

Connection bases (viewed from below)  
2 = Relay set



E1

Fuel pressure test

Opel Commodore, Senator, Monza



E2

Fuel pressure test

Opel Commodore, Senator, Monza



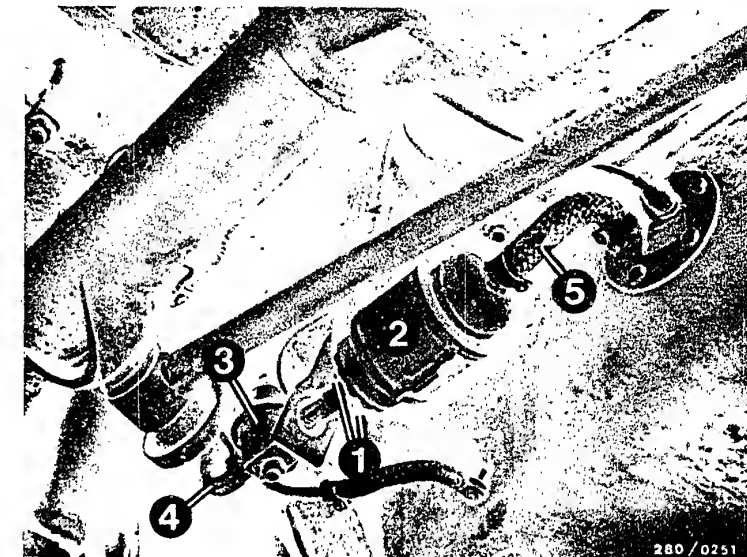
# Fuel pressure test (continued)

4. Ground connection of fuel pump O.K.?  
If not → test for open circuit and good connection in ground terminal (in luggage compartment between both wheel houses on right behind the rear seat panel) and in ground lead.  
Fuel pump operating? If not →  
5. Start engine and test voltage at disconnected pump plug (set value min. 12 V). If voltage present, replace fuel pump

yes

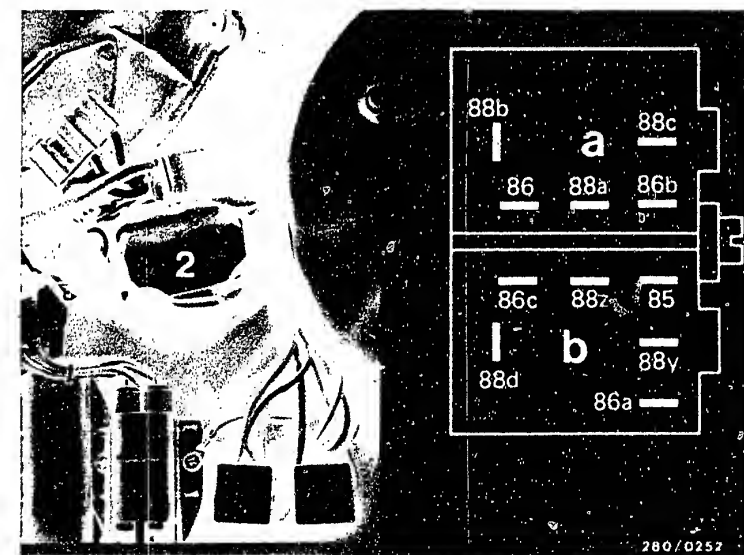
yes

Continued on E 5/E 6



- 1 = Electrical connections
- 2 = Electric fuel pump
- 3 = Fuel pressure damper
- 4 = Fuel delivery line
- 5 = Fuel intake line

Connection bases (viewed from below)  
2 = Relay set



**E3**

Fuel pressure test

Opel Commodore, Senator, Monza



**E4**

Fuel pressure test

Opel Commodore, Senator, Monza





# Fuel pressure test (continued)

Fuel pressure O.K.?

Test specification

2.8...3.2 bar

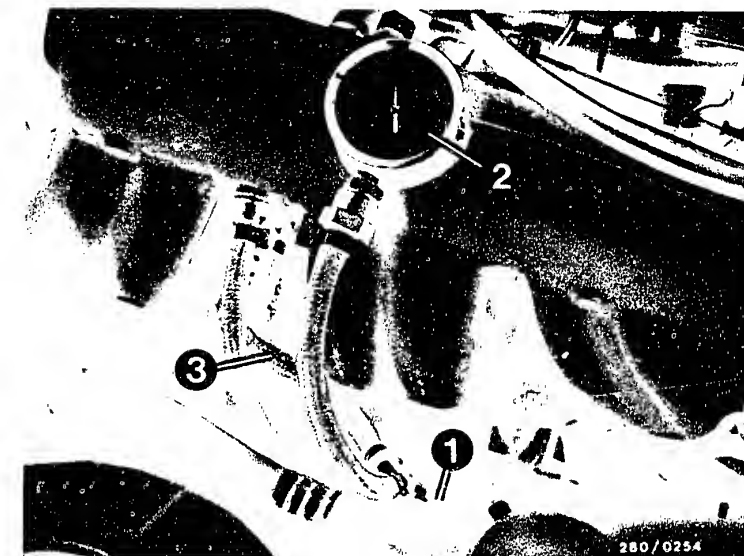
Test specification reached?

no

Connect fuel pressure gauge.

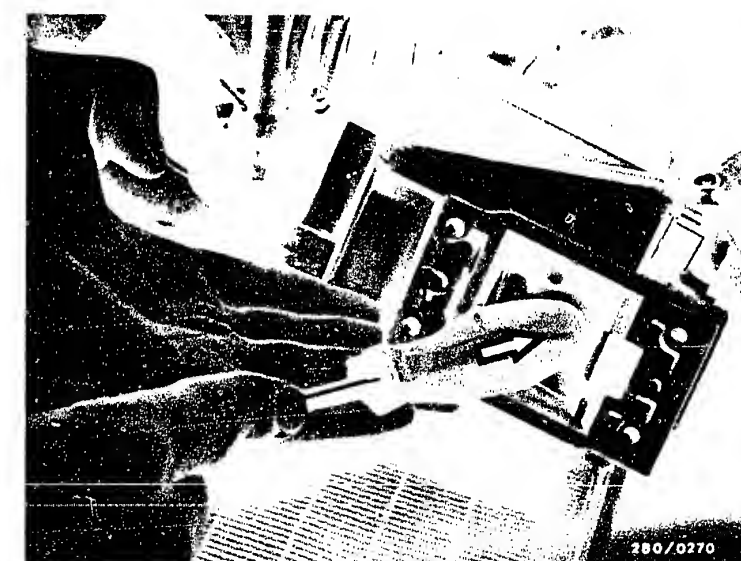
yes

Continued on E 7/E 8



- 1 = To connection (pressure side)
- 2 = Pressure gauge
- 3 = Fuel return line

Opening the air-flow sensor flap



E5

Fuel pressure test

Opel Commodore, Senator, Monza



E6

Fuel pressure test

Opel Commodore, Senator, Monza





# Fuel pressure test (continued)

yes

## Testing:

Remove hose from fuel delivery line. Connect pressure gauge.

Caution: When removing the fuel hose, make sure that no fuel gets onto hot parts of the engine.

## Testing the fuel pressure

Connect the connections of the pressure tester into the fuel delivery line. If using pressure tester KDJE-P 100, close the hollow screw.

Unscrew fuel delivery line (at wheel box junction on right-hand side)

Plug Y-connecting piece of pressure tester onto the hose to the fuel-distribution pipe. Plug the hose of the pressure tester onto the fuel delivery line. Make sure there are no leaks. Switch on the ignition.

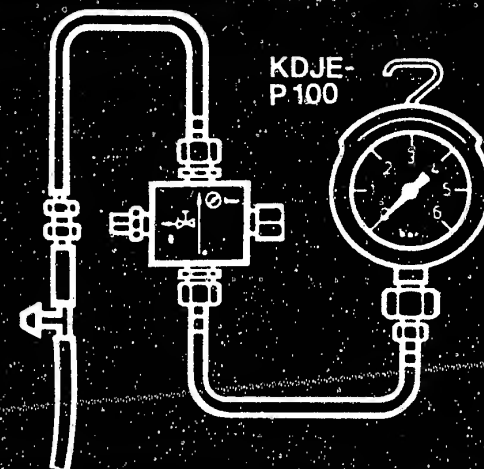
Remove hose between air filter and air-flow sensor. Slightly deflect air-flow sensor flap (pump contact must close).

Fuel pump must operate.

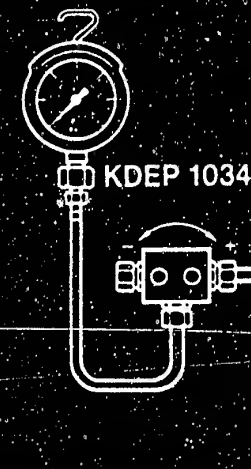
Fuel pump pressure 2.8...3.2 bar

Let engine idle - fuel pump pressure approx. 2.5 bar.

Continued on E 9/E 10



280/0331



280/0332



280/0333

E7

Fuel pressure test

Opel Commodore, Senator, Monza



E8

Fuel pressure test

Opel Commodore, Senator, Monza



## Fuel pressure test (continued)

### Testing the pressure regulator

Switch on the ignition. Slightly deflect air-flow sensor flap (pump contact must close). Electric fuel pump must operate.

### Fuel pump pressure

Test specifications: 2.8...3.2 bar

### Fuel pressure of 2.8 bar not reached:

1. Slowly pinch off fuel return line: (Caution: do not load pressure gauge above 6 bar).  
Pressure rises above 4 bar —>  
Replace pressure regulator.  
Pressure remains below 4 bar —>  
Replace fuel pump.
2. Test fuel delivery line and fuel filter for throughflow.
3. Strainer in tank clogged.
4. Corrosion in tank.

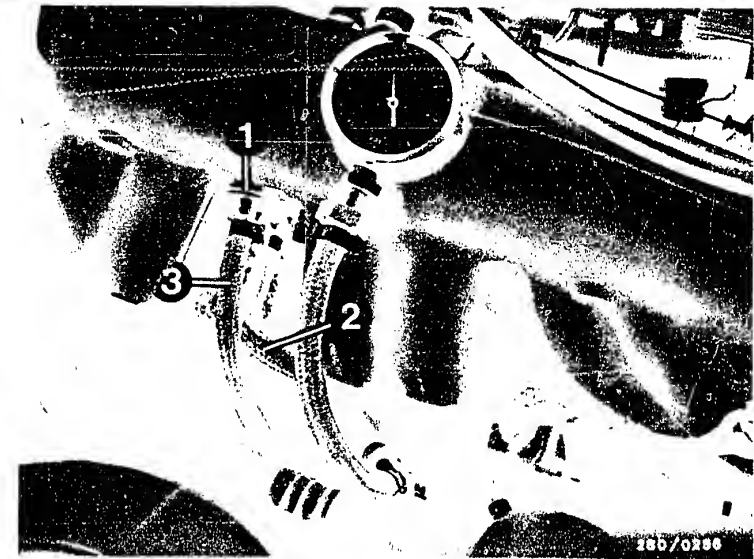
### Fuel pressure of 3.2 bar exceeded:

1. Fuel return line clogged or pinched.
2. Replace pressure regulator

Refit hose between air filter and air-flow sensor and tighten hose clamp securely (leaks).

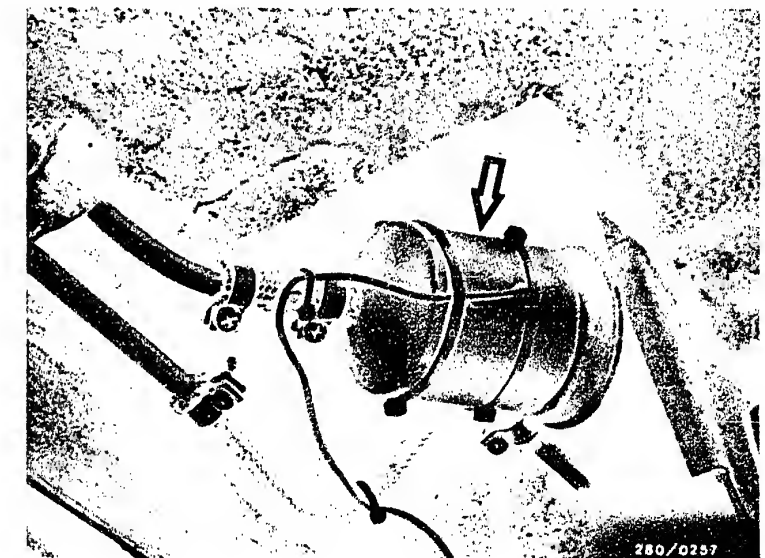
yes

Continued on E 11 / E 12



- 1 = Pressure regulator
- 2 = Fuel delivery line
- 3 = Fuel return line

Arrow = Fuel filter



**E9**

Fuel pressure test  
Opel Commodore, Senator, Monza



**E10**

Fuel pressure test  
Opel Commodore, Senator, Monza



## Fuel pressure test (continued)

Does fuel pressure remain constant after engine has started?

no

Test fuel pump contact in air-flow sensor:

Remove air hoses and connector. Connect ohmmeter to term. 36 and term. 39 of air-flow sensor. Open air-flow sensor flap slightly by hand. Reading must change from  $\infty \Omega$  to  $0 \Omega$ . If not, replace air-flow sensor.

yes

The fuel pressure test is now completed.

If the fault has not been found or if you require further information on how to remedy the fault, continue with the trouble-shooting program of your choice.

Detailed trouble-shooting  $\longrightarrow$  Coordinate B 3

Direct trouble-shooting  $\longrightarrow$  Coordinate B 5



Opening the air-flow sensor flap

**E11**

Fuel pressure test

Opel Commodore, Senator, Monza



**E12**

Fuel pressure test

Opel Commodore, Senator, Monza



## Trouble-shooting program according to customer complaints

### How to use the following trouble-shooting program

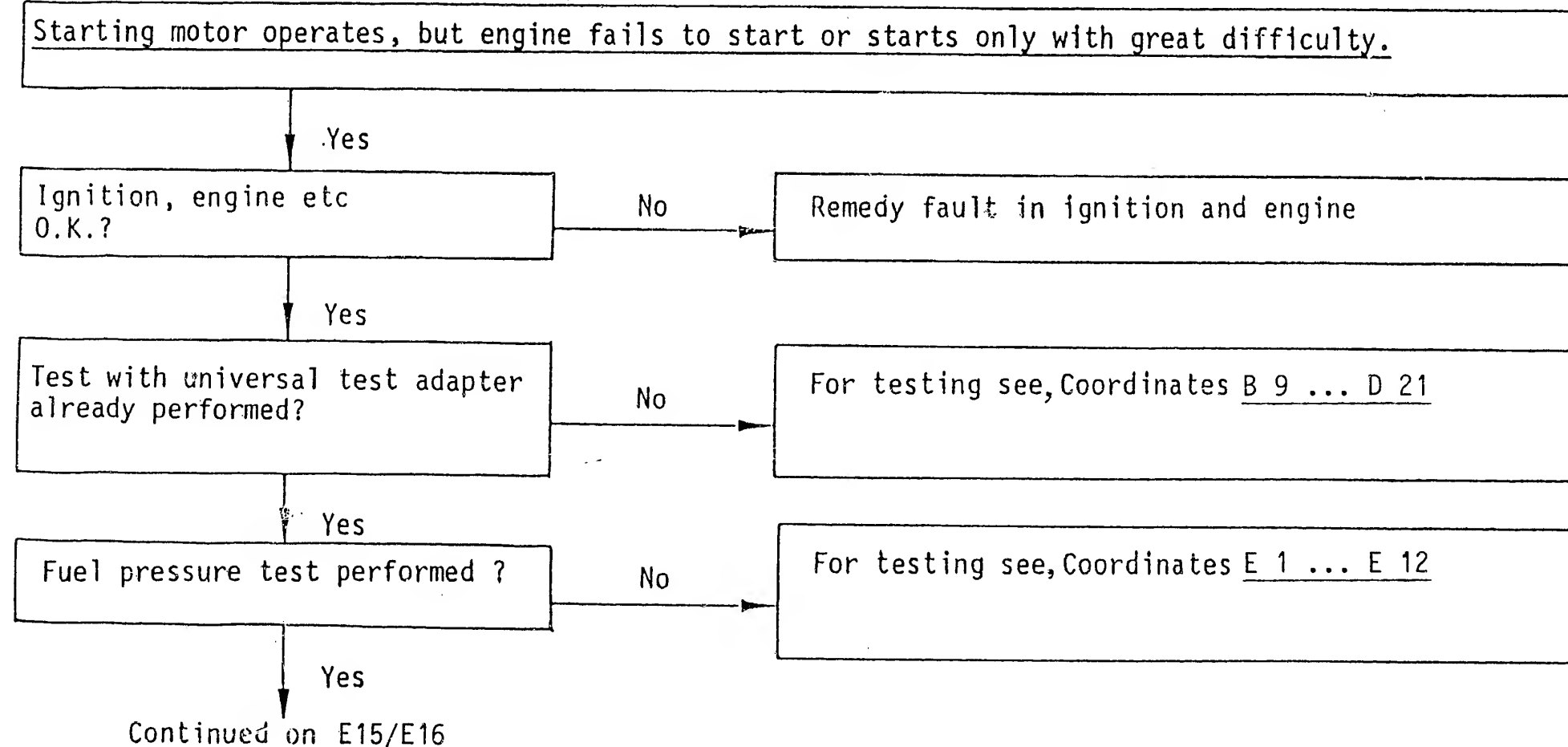
The program is divided into three rows of boxes:

1. The left-hand row contains the questions on the tests.
2. The middle row contains descriptions of the testing and adjustment operations on the components.
3. The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row and carry out the tests given there.

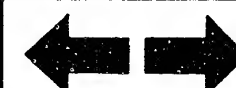
When you have finished testing, continue trouble-shooting at the point at which you branched off.

**E13**

Engine fails to start  
Opel Commodore, Senator, Monza

**E14**

Engine fails to start  
Opel Commodore, Senator, Monza



Starting motor operates, engine fails to start or starts only with great difficulty.  
(Continued)

Auxiliary-air device tested?  
(Mechanically O.K.?)

No

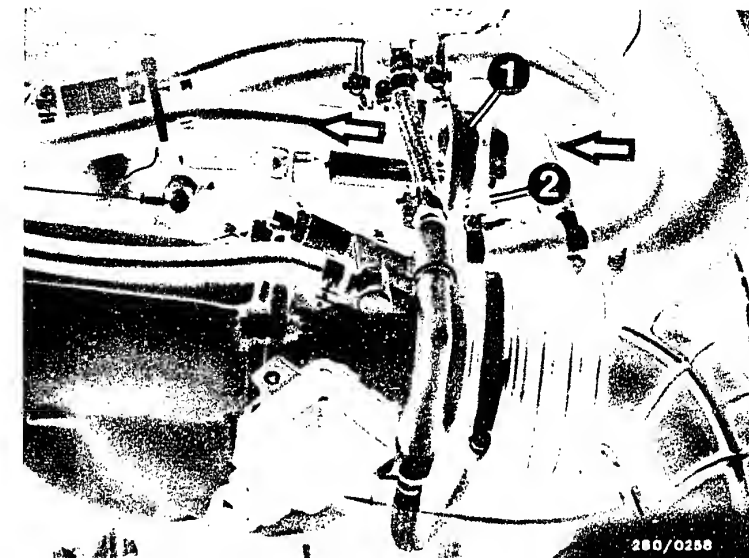
Testing:

1. Visual examination of auxiliary-air device:  
When cold, the device must be open; when the engine is warm, it must be closed. If not, replace auxiliary-air device. (Remove hoses and look down, possibly using a small mirror).

2. Functional test of auxiliary-air device:  
With the engine cold, pinch off hose to auxiliary-air device. Engine speed must drop. With the engine warm, pinch off hose to auxiliary-air device. Engine speed must not drop. If incorrect, replace auxiliary-air device (pay attention to direction of flow).

Yes

Continued on E 17/E 18



1 = Auxiliary-air device  
2 = Temperature sensor II (engine)  
Arrows = Direction of flow

**E15**

Engine fails to start  
Opel Commodore, Senator, Monza



**E16**

Engine fails to start  
Opel Commodore, Senator, Monza



Starting motor operates, engine fails to start or starts only with great difficulty  
(continued)

Temperature sensors tested?

nc

yes

Continued on E 19 / E 20

# Testing:

Temperature sensor I measures the intake air temperature and is situated in the air duct of the air-flow sensor. Measure the following values between term. 27 and term. 6 of the air-flow sensor:

At ambient temperature (approx. +15...+30°C): 1.45...3.3 kΩ

With engine at op. temp. (approx. +80°C): 280...360 Ω

Using ohmmeter, measure directly at temperature sensor II (engine). Resistance measurement at term. 13 and term. 49 (ground):

At ambient temperature (approx. +15...+30°C): 1.45...3.3 kΩ

With engine at op. temp. (approx. +80°C): 280...360 kΩ

If incorrect, check the following leads for open circuit and short circuit using ohmmeter:

## Temperature sensor I:

- From multiple plug term. 27 to air-flow sensor term. 27.
- From air-flow sensor term. 6 to multiple plug term. 6.

## Temperature sensor II:

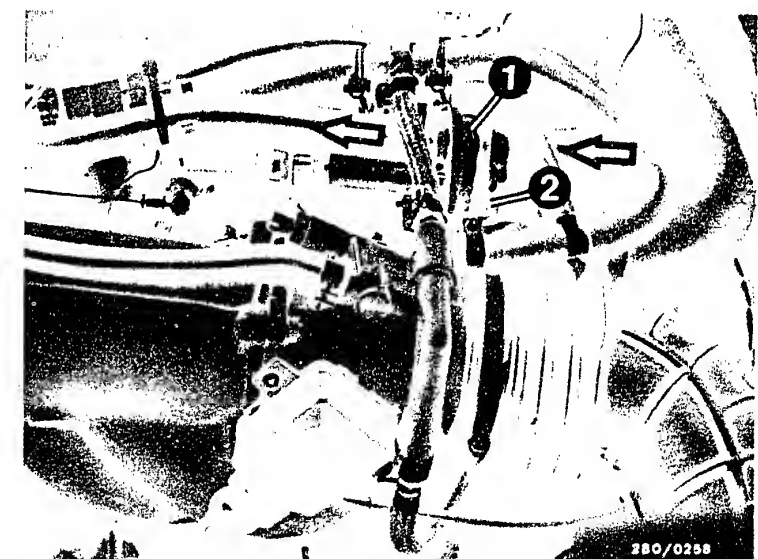
- From multiple plug term. 13 to temperature sensor II term. 13.
- From temperature sensor II term. 49 to central ground (lead 49).

Check all contacts in the plug-in connections.



- 1 = Air-flow sensor
- 2 = Temperature sensor I (air)
- 3 = Stopper

- 1 = Auxiliary-air device
  - 2 = Temperature sensor II (engine)
- Arrows = Direction of flow



**E17**

Engine fails to start,  
Opel Commodore, Senator, Monza



**E18**

Engine fails to start,  
Opel Commodore, Senator, Monza





Starting motor operates, engine fails to start or starts only with great difficulty (cont.)

Air-flow sensor O.K.?

no

#### Testing:

Open air-flow sensor flap by hand. It must be possible to move the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. When released, the flap must close completely by itself. The sensor flap must not catch when it is being opened. Watch for signs of abrasion or rubbing. Clean the air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are signs of abrasion or rubbing, replace the air-flow sensor. Connect ohmmeter to term. 7 and term. 8 of air-flow sensor. Measure resistance. Deflect air-flow sensor flap. Remove hose between air filter and air-flow sensor.

#### Test specifications

Air-flow sensor 0 280 202 007:  
100...500  $\Omega$

Air-flow sensor 0 280 202 007:  
(as of FD 147): 200...1000  $\Omega$

Air-flow sensor 0 280 202 024:  
200...1000  $\Omega$

#### How to remove:

To remove the air-flow sensor, open the 4 clamp fasteners on the air filter and loosen the air hose. Unscrew the 4 fastening screws of the air-flow sensor from inside the top part of the air filter.

#### Caution:

After testing is completed, refit the hose between air filter and air-flow sensor. Securely tighten the hose clamp (leaks).

yes

Continued on E21/E22

**E19**

Engine fails to start

Opel Commodore, Senator, Monza



**E20**

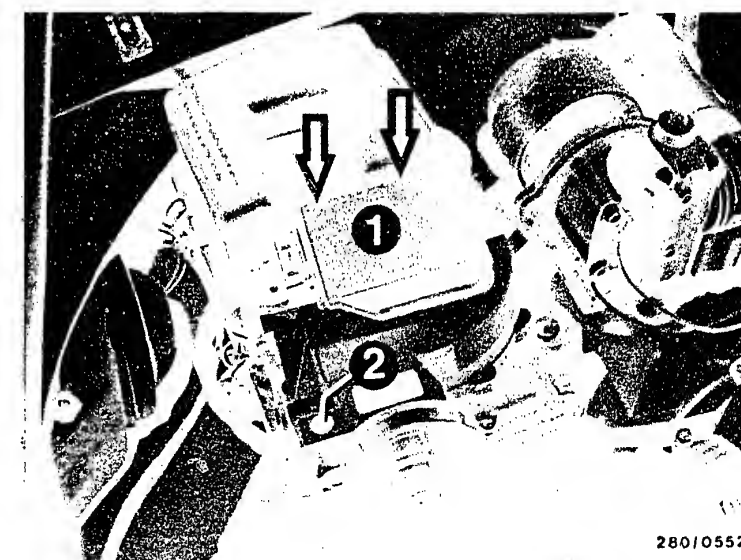
Engine fails to start

Opel Commodore, Senator, Monza



Opening the air-flow sensor flap

1 = Air-flow sensor  
2 = CO adjusting screw  
Arrows = Fastening screws



280/0552

Starting motor operates, engine fails to start or starts only with great difficulty  
(continued)

Are all hose lines and electrical lead connections properly attached?  
Visual examination.  
Is the air-intake system leak-tight?

no

Check whether the hoses of the air-intake system and of the fuel line system are properly attached, not kinked or damaged. If necessary, replace hoses. Eliminate leaks by means of new seals or by retightening the connecting screws.

Checking for leaks:

Seal off the exhaust tail pipe. Unscrew hose from air filter to air-flow sensor on air-flow sensor and seal off air-flow sensor duct. Remove hose after auxiliary-air device and, using compressed-air gun, blow air (0.3 bar) into the intake manifold. Seal off auxiliary-air device connection port. Open throttle valve fully while doing this. Brush or spray all joints with soapy water. Bubbling or foaming indicates a leak.

Caution!

Reconnect all hoses and tighten hose clamps securely. Check for leaks.  
Check electrical plug-in contacts for loose contacts.

yes

Testing completed for customer complaint

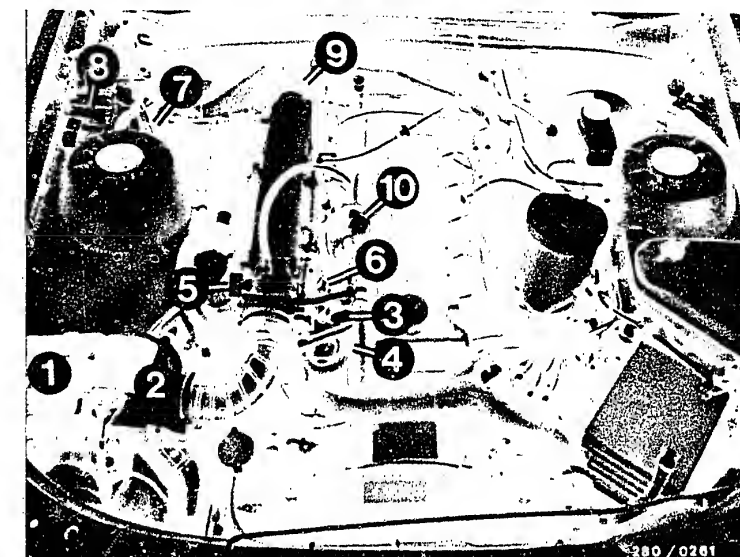
"Starting motor operates, engine fails to start or starts only with great difficulty"

Customer complaint remedied?

no

Further possibilities:

- Customer complaint incorrectly diagnosed (Coordinates B 3...B 8).  
If the fault has not been detected by "direct trouble-shooting", see "detailed trouble-shooting" (Coordinates B3/B4).
- Engine not mechanically O.K. (compression; valve setting, valve timing, worn camshaft).



- 1 = Air filter
- 2 = Air-flow sensor
- 3 = Auxiliary-air device
- 4 = Temperature sensor II (engine)
- 5 = Throttle-valve switch
- 6 = Injection valves
- 7 = Relay set
- 8 = Series resistors
- 9 = Central ground
- 10 = Solenoid-operated air valve

E21

Engine fails to start  
Opel Commodore, Senator, Monza



E22

Engine fails to start  
Opel Commodore, Senator, Monza





## Trouble-shooting program according to customer complaints

### How to use the following trouble-shooting program

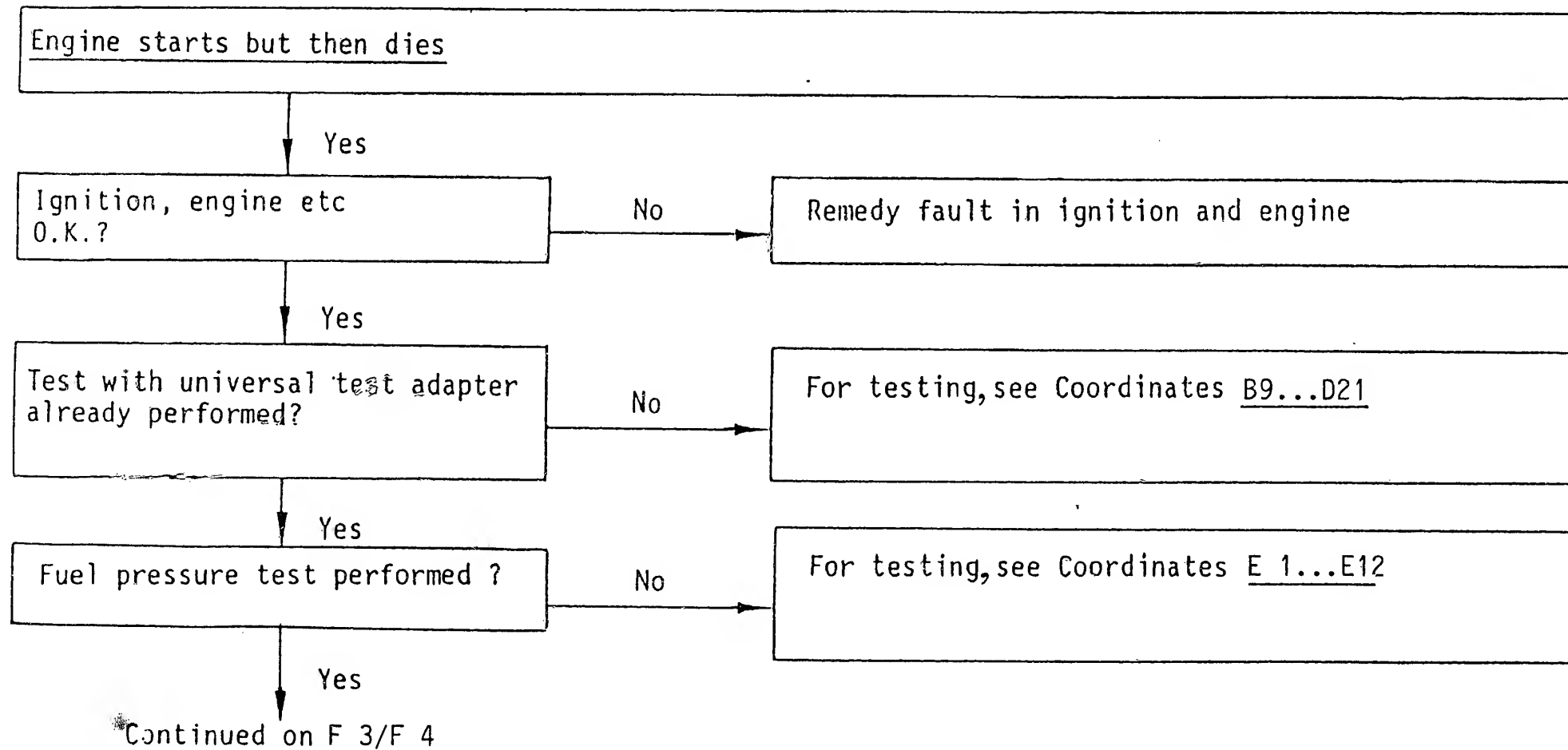
The program is divided into three rows of boxes:

1. The left-hand row contains the questions on the tests.
2. The middle row contains descriptions of the testing and adjustment operations on the components.
3. The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row and carry out the tests given there.

When you have finished testing, continue trouble-shooting at the point at which you branched off.



**F1**

Engine starts but then dies  
Opel Commodore, Senator, Monza



**F2**

Engine starts but then dies  
Opel Commodore, Senator, Monza



Engine starts but then dies (continued)

Auxiliary-air device tested  
(mechanically O.K.?)

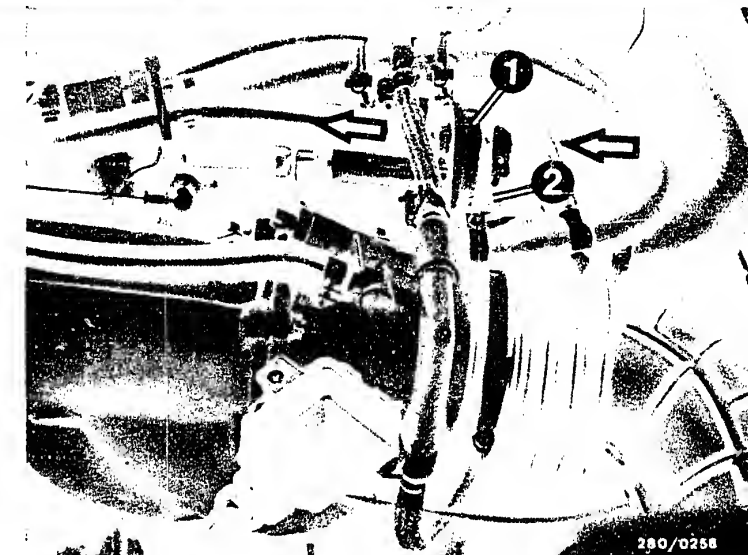
no

Testing:

1. Visual examination of auxiliary-air device:  
With the engine cold, the device must be open. .  
With the engine warm, it must be closed. If  
incorrect, replace auxiliary-air device. (Remove  
hoses and look down, possibly using a small mirror).
2. Functional test of auxiliary-air device:  
With the engine cold, pinch off hose to auxiliary-  
air device.  
Engine speed must drop.  
With engine warm, pinch off hose to auxiliary-air  
device.  
Engine speed must not drop.  
If incorrect, replace auxiliary-air device (pay  
attention to direction of flow).

yes

Continued on F 5 / F 6



- 1 = Auxiliary-air device  
2 = Temperature sensor II  
(engine)  
Arrows = Direction of flow

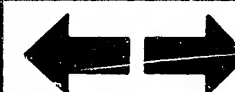
**F3**

Engine starts but then dies  
Opel Commodore, Senator, Monza



**F4**

Engine starts but then dies  
Opel Commodore, Senator, Monza



Engine starts but then dies (continued)

Temperature sensors tested?

no

Testing:

Temperature sensor I measures the intake air temperature and is situated in the air duct of the air-flow sensor. Measure the following values between term. 27 and term. 6 of the air-flow sensor:

At ambient temperature  
(approx. +15...+30°C): 1.45...3.3 kΩ

With engine at op. temp.  
(approx. +80°C): 280...360Ω

Using ohmmeter, measure directly at temperature sensor II (engine). Resistance measurement at term. 13 and term. 49 (ground):

At ambient temperature  
(approx. +15...+30°C): 1.45...3.3 kΩ

With engine at op. temp.  
(approx. +80°C): 280...360Ω

If incorrect, check the following leads for open circuit and short circuit using ohmmeter:

Temperature sensor I:

- From multiple plug term. 27 to air-flow sensor term. 27.
- From air-flow sensor term. 6 to multiple plug term. 6.

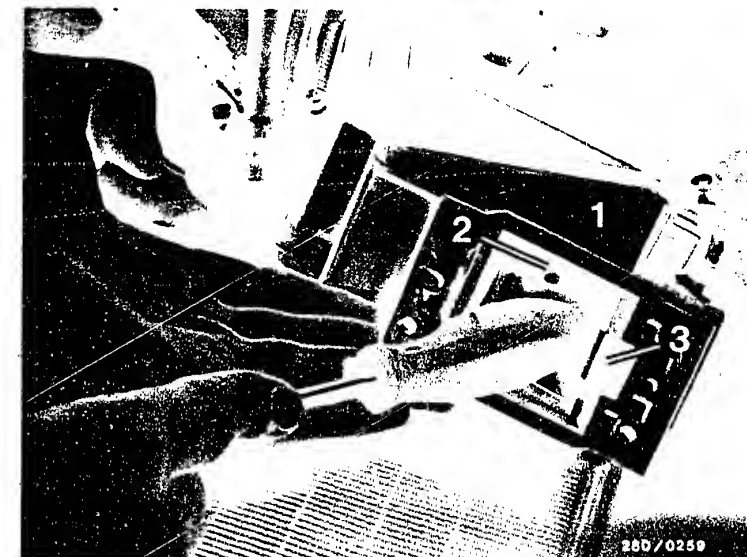
Temperature sensor II:

- From multiple plug term. 13 to temperature sensor II term. 13.
- From temperature sensor II term. 49 to central ground (lead 49).

Check all contacts in the plug-in connection.

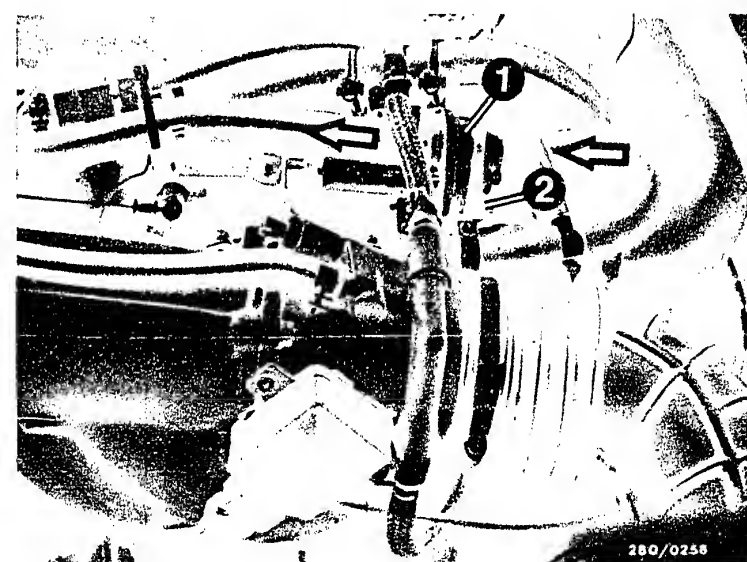
yes

Continued on F 7 / F 8



1 = Air-flow sensor  
2 = Temperature sensor I (air)  
3 = Stopper

1 = Auxiliary-air device  
2 = Temperature sensor II (engine)  
Arrows= Direction of flow



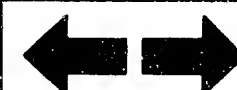
**F5**

Engine starts but then dies  
Opel Commodore, Senator, Monza



**F6**

Engine starts but then dies  
Opel Commodore, Senator, Monza



# Engine starts but then dies (continued)

Air-flow sensor O.K.?

no

## Testing:

Remove hose between air filter and air-flow sensor. Open air-flow sensor flap by hand. It must be possible to open the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. When released, the flap must close completely by itself. Air-flow sensor flap must not catch when it is being opened. Watch for signs of abrasion or rubbing. Clean the air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are signs of abrasion or rubbing, replace the air-flow sensor. Connect ohmmeter to term. 7 and term. 8 of air-flow sensor. Measure resistance. Deflect air-flow sensor flap.

## Test specifications:

Air-flow sensor 0 280 202 007:  
100...500Ω

Air-flow sensor 0 280 202 007  
(as of FD 147): 200...1000Ω

Air-flow sensor 0 280 202 024  
200...1000Ω

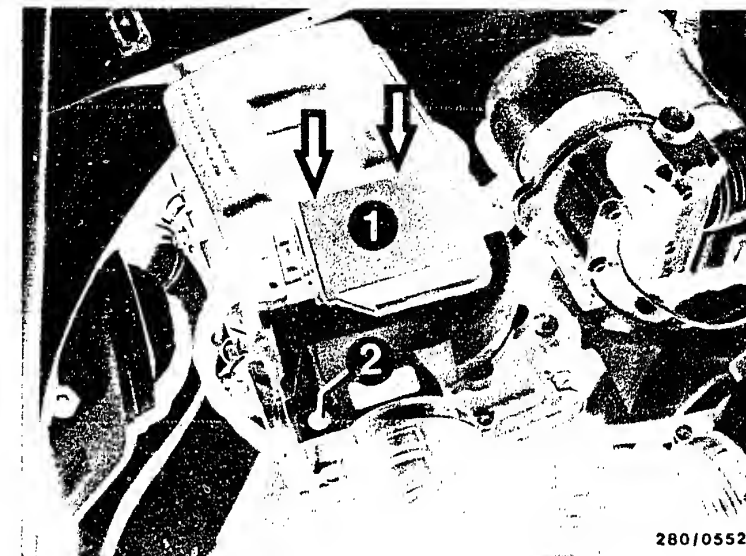
Test fuel pump contact in air-flow sensor:

## 1. Air-flow sensor up to FD 050:

Remove air hoses and plug. Connect ohmmeter to term. 36 and term. 39 of air-flow sensor. Slightly open air-flow sensor flap by hand. Reading must change from ∞Ω to 0 Ω. If not, replace air-flow sensor.

yes

Continued on F 9 / F 10



280/0552

1 = Air-flow sensor  
2 = CO adjusting screw  
Arrows = Fastening screws

Opening the air-flow sensor flap



280/0270

**F7**

Engine starts but then dies  
Opel Commodore, Senator, Monza



**F8**

Engine starts but then dies  
Opel Commodore, Senator, Monza



Engine starts but then dies (continued)

yes

2. Air-flow sensor as of FD 051:

Engine stopped while hot

Remove plug from air-flow sensor and connect ohmmeter to term. 6 and term. 36. Positive pole of ohmmeter to term. 6 = approx.  $0\Omega$ . With reversed polarity: approx.  $\infty\Omega$ .

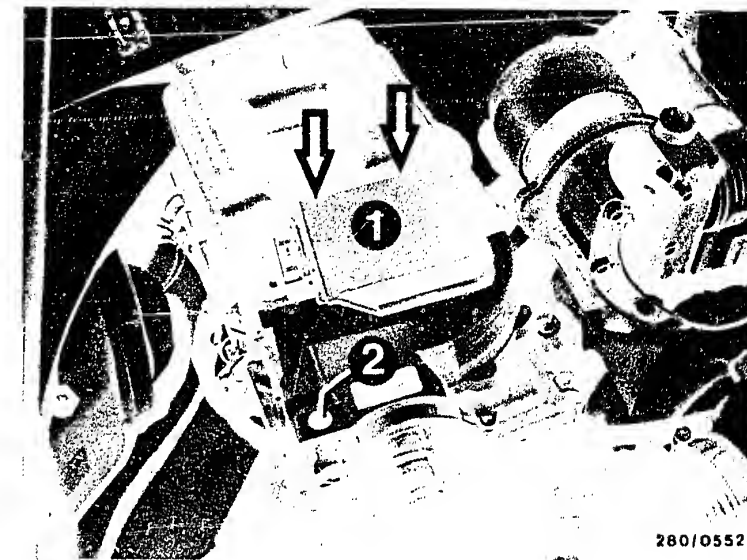
If readings incorrect —> replace air-flow sensor.

How to remove:

To remove the air-flow sensor, open the 4 clamp fasteners on the air filter and loosen the air hose. Unscrew the 4 fastening screws of the air-flow sensor from inside the top part of the air filter.

Caution:

After testing is completed, refit the hose between air filter and air-flow sensor. Securely tighten the hose clamp (leaks).



1 = Air-flow sensor

2 = CO adjusting screw

Arrows = Fastening screws

Continued on F 11 / F 12

**F9**

Engine starts but then dies

Opel Commodore, Senator, Monza



**F10**

Engine starts but then dies

Opel Commodore, Senator, Monza



Engine starts but then dies (continued)

Are all hose lines and electric leads securely attached?  
Visual examination. Is the air-intake system leak-tight?

No

Check whether hoses of air-intake system and of fuel line system are securely attached, not kinked or damaged. If necessary, replace hoses. Eliminate leaks with new seals or by re-tightening the connecting screws.

Checking for leaks:

Seal off exhaust tail pipe. Screw off hose from air filter to air-flow sensor on air-flow sensor and seal off air-flow sensor duct. Pull off hose after auxiliary-air device and blow air (0.3 bar) into the intake manifold with a compressed-air gun. Seal off connection port on auxiliary-air device. Open throttle valve fully while doing this. Brush or spray all joints with soapy water. Bubbling or foaming indicates a leak.

Check electric contacts for loose connection.

Yes

Testing completed for customer complaint

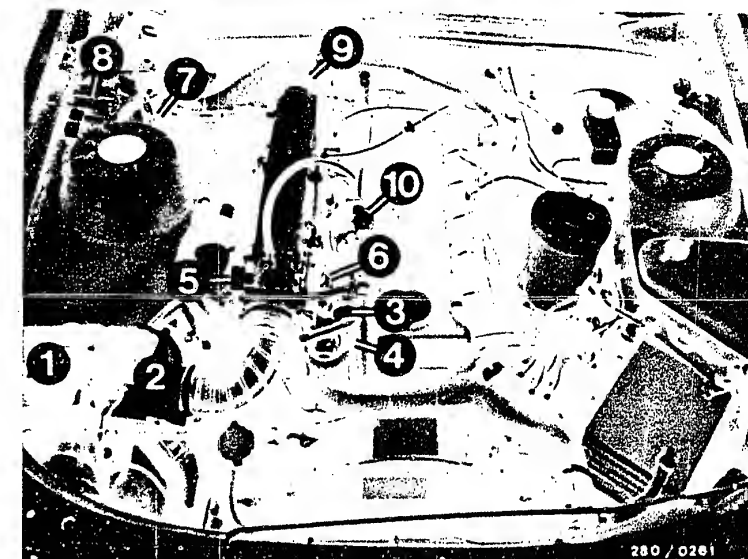
"Engine starts but then dies"

Customer complaint remedied?

No

Further possibilities:

- Customer complaint incorrectly diagnosed (see Coordinates B3...B8). If the fault has not been detected by "direct trouble-shooting", see "detailed trouble-shooting" (Coordinates B3/B4).
- Engine not mechanically O.K. (Compression, valve setting, valve timing, worn camshaft).



- 1=Air filter
- 2=Air-flow sensor
- 3=Auxiliary-air device
- 4=Temperature sensor II (engine)
- 5=Throttle-valve switch
- 6=Injection valves
- 7=Relay set
- 8=Series resistors
- 9=Central ground
- 10=Solenoid-operated air valve

**F11**

Engine starts but then dies  
Opel Commodore, Senator, Monza



**F12**

Engine starts but then dies  
Opel Commodore, Senator, Monza





## Trouble-shooting program according to customer complaints

### How to use the following trouble-shooting program

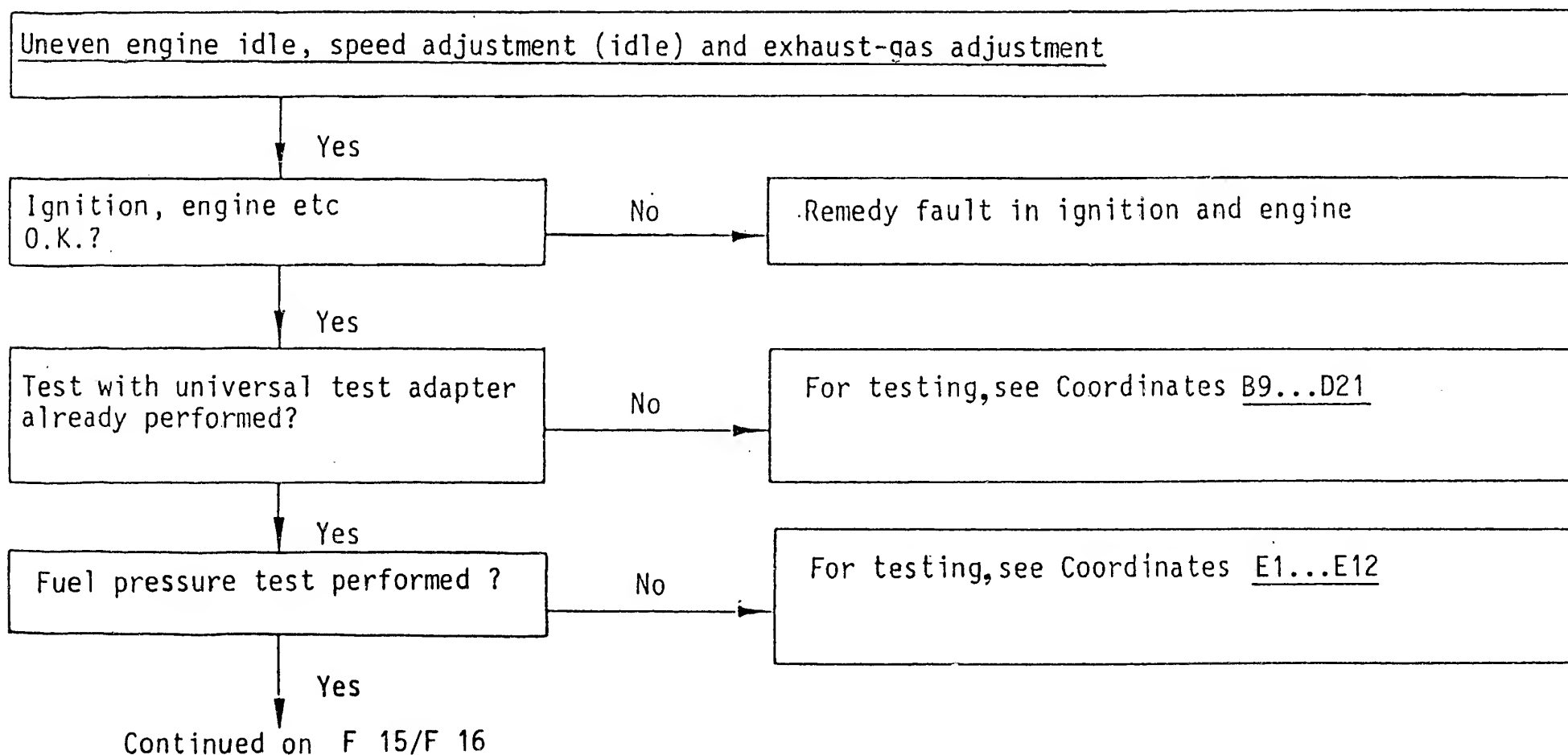
The program is divided into three rows of boxes:

1. The left-hand row contains the questions on the tests.
2. The middle row contains descriptions of the testing and adjustment operations on the components.
3. The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row and carry out the tests given there.

When you have finished testing, continue trouble-shooting at the point at which you branched off.

**F13**

Uneven engine idle

Opel Commodore, Senator, Monza

**F14**

Uneven engine idle

Opel Commodore, Senator, Monza



# Uneven engine idle, speed adjustment (idle) and exhaust-gas adjustment (Continued)

Throttle valve  
closed?

No

## Testing:

Throttle valve closed?

Check whether the throttle valve can be closed still further and whether the engine speed thereby drops.

## Adjustment:

Throttle valve must be set just before it sticks with the throttle-valve stop screw. Straighten throttle linkage if bent.

Yes

CO and idle speed  
correctly adjusted?

No

## CO and idle adjustment

Exhaust-gas test with CO analyzer with engine at normal operating temperature and at idle speed

Idle speed 2.5 E engine:

Manually-shifted transmission 800...850 min<sup>-1</sup>

Automatic transmission

(Selector lever in position "P")

800...850 min<sup>-1</sup>

Idle speed 3.0 E engine:

Manually-shifted transmission 850...900 min<sup>-1</sup>

Automatic transmission

(Selector lever in position "P")

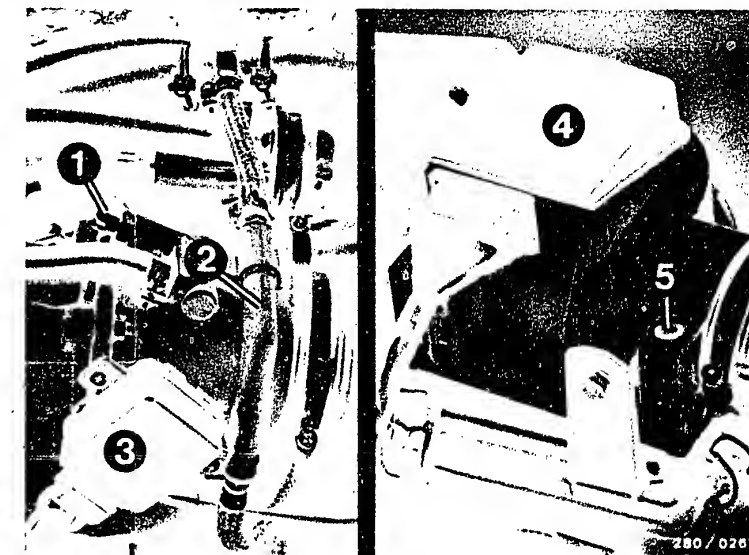
850...900 min<sup>-1</sup>

CO setting for both engines: max. 1.0 % by vol. CO

Let warmed-up engine idle with the air conditioner (if fitted) switched off. Connect connecting leads on solenoid-operated air valve to battery voltage. Idle speed is raised by approx 150 min<sup>-1</sup>. If there is no change in idle speed, replace the solenoid-operated air valve.

Yes

Continued on F 17/F 18



1 = Idle-speed-adjusting screw

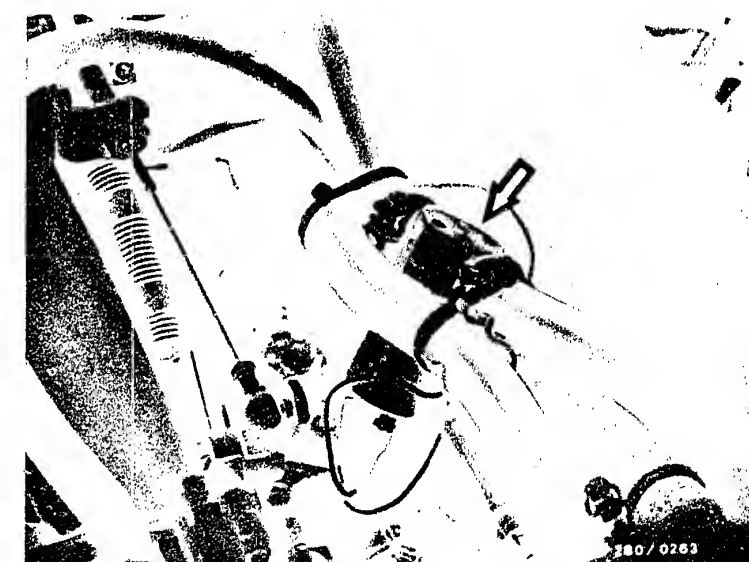
2 = Throttle-valve preheating

3 = Throttle-valve switch

4 = Air-flow sensor

5 = CO adjusting screw

Arrow = Solenoid-operated air valve



F15

Uneven engine idle

Opel Commodore, Senator, Monza



F16

Uneven engine idle

Opel Commodore, Senator, Monza





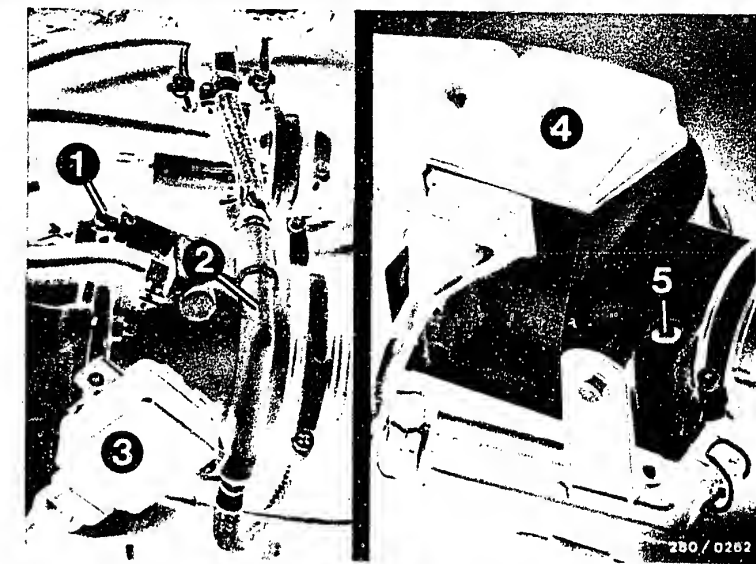
Uneven engine idle, speed adjustment (idle) and exhaust-gas adjustment  
(continued)

Can idle speed not be adjusted?

no

If CO concentration too high, turn bypass screw (CO adjusting screw) in air-flow sensor half a turn in a counterclockwise direction. Test idle speed and CO concentration again. Perform corrections in several steps. After adjusting, use new plugs.  
As of FD 246:  
CO adjusting screw with hexagon-socket-head AF 5..

yes



- 1 = Idle-speed adjusting screw
- 2 = Throttle-valve preheating
- 3 = Throttle-valve switch
- 4 = Air-flow sensor
- 5 = CO adjusting screw

Continued on F 19 / F 20

**F17**

Uneven engine idle  
Opel Commodore, Senator, Monza



**F18**

Uneven engine idle  
Opel Commodore, Senator, Monza



# Uneven engine idle, speed adjustment (idle) and exhaust-gas adjustment (continued)

Temperature sensors tested?

no

## Testing:

Temperature sensor I measures the intake air temperature and is situated in the air duct of the air-flow sensor. Measure the following values between term. 27 and term. 6 of the air-flow sensor

At ambient temperature  
(approx. +15...+30°C): 1.45...3.3 kΩ

With engine at op. temp.  
(approx. +80°C): 280...360Ω

Using ohmmeter, measure directly at temperature sensor II (engine). Resistance measurement at term. 13 and term. 49 (ground):

At ambient temperature  
(approx. +15...+30°C): 1.45...3.3 kΩ

With engine at op. temp.  
(approx. +80°C): 280...360Ω

If incorrect, check the following leads for open circuit and short circuit using ohmmeter:

## Temperature sensor I:

- From multiple plug term. 27 to air-flow sensor term. 27
- From air-flow sensor term. 6 to multiple plug term. 6.

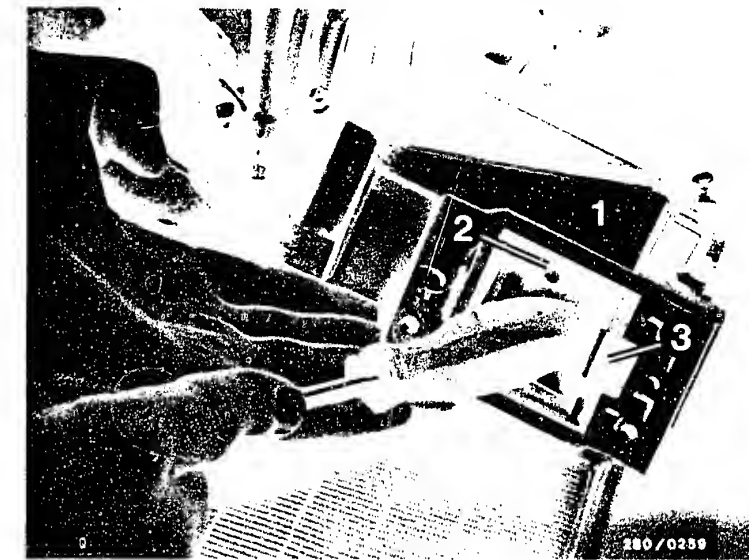
## Temperature sensor II:

- From multiple plug term. 13 to temperature sensor II term. 13.
- From temperature sensor II term. 49 to central ground (lead 49).

Check all contacts in the plug-in connections.

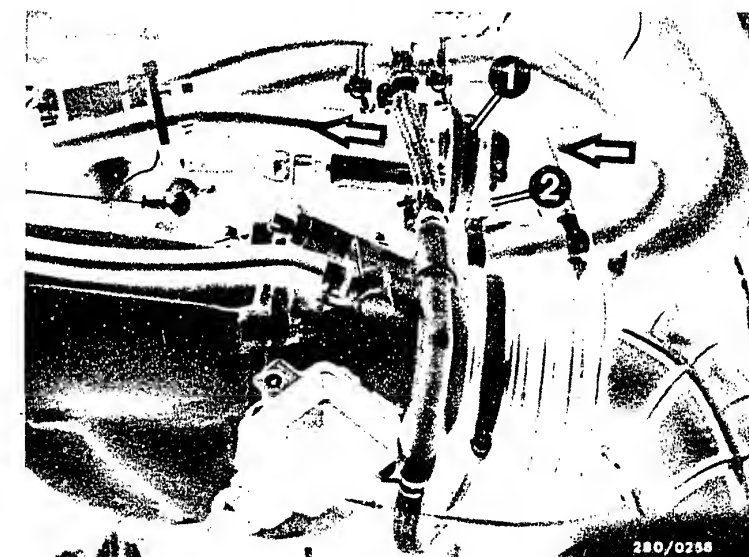
yes

Continued on F 21 / F 22



1 = Air-flow sensor  
2 = Temperature sensor I (air)  
3 = Stopper

1 = Auxiliary-air device  
2 = Temperature sensor II (engine)  
Arrows = Direction of flow



**F19**

Uneven engine idle

Opel Commodore, Senator, Monza



**F20**

Uneven engine idle

Opel Commodore, Senator, Monza



# Uneven engine idle, speed adjustment (idle) and exhaust-gas adjustment (Continued)

Auxiliary-air device  
tested? (Mechanically  
O.K.?)

No

## Testing:

1. Visual examination of auxiliary-air device:  
When cold, the device must be open; when the engine is warm, it must be closed. If not, replace auxiliary-air device. (Remove hoses and look down; possibly using a small mirror).
2. Functional test of auxiliary-air device:  
With the engine cold, pinch off hose to auxiliary-air device. Engine speed must drop. With the engine warm, pinch off hose to auxiliary-air device. Engine speed must not drop. If incorrect, replace auxiliary-air device (pay attention to direction of flow).

Yes

Injection valve  
mechanically O.K.?

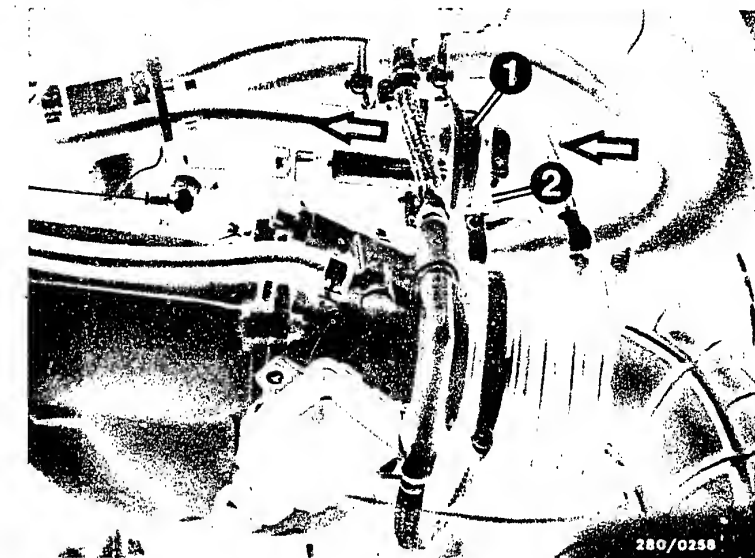
No

With the engine running, disconnect injection valve connectors individually, one after the other, from the injection valves and plug on again. Engine speed must drop if injection valve is O.K.  
Test the following connection leads for continuity:

- From relay set term. 88b to series resistor term. 43 and 43/2.
- From series resistor through the injection valves to control unit term. 14, 15, 30, 31, 32 and 33.

If necessary, replace leads, series resistor or injection valves.

Yes



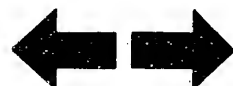
1 = Auxiliary-air device  
2 = Temperature sensor II  
Arrows = Direction of flow

Continued on F 23/F 24

**F21**

Uneven engine idle

Opel Commodore, Senator, Monza



**F22**

Uneven engine idle

Opel Commodore, Senator, Monza



Uneven engine idle, speed adjustment (idle) and exhaust-gas adjustment  
(Continued)

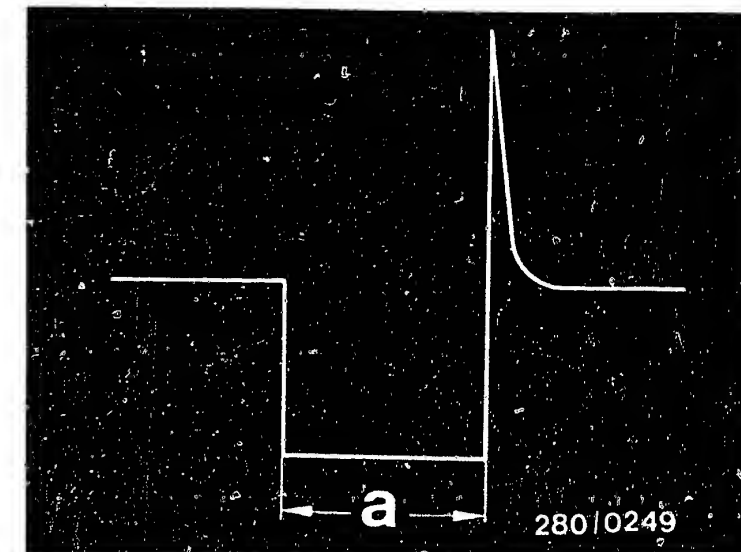
Injection valves checked  
for proper operation?

No

Connect the test lead as follows:  
The two-pole plug connectors of the test lead are connected between an injection valve and its connecting lead. Of the other two terminals of the test lead, only one must be connected to the special input of the motortester.  
When the correct terminal is connected, the diagram shown opposite is visible.  
Using the test lead, the injection pulses at the injection valves can be tested with an ignition oscilloscope with the engine running.  
If the diagram opposite is not obtained or if there are deviations (interference, missing etc), the other injection valves should also be tested.  
In case of interference → check routing of leads.  
In case of missing → eliminate loose contacts in leads or in plug-in connections.

Yes

Continued on G 1/G 2



Injection pulse of a switched output stage

(measured at injection valve)

a = Pulse length  
(dependent on engine load)

**F23**

Uneven engine idle

Opel Commodore, Senator, Monza



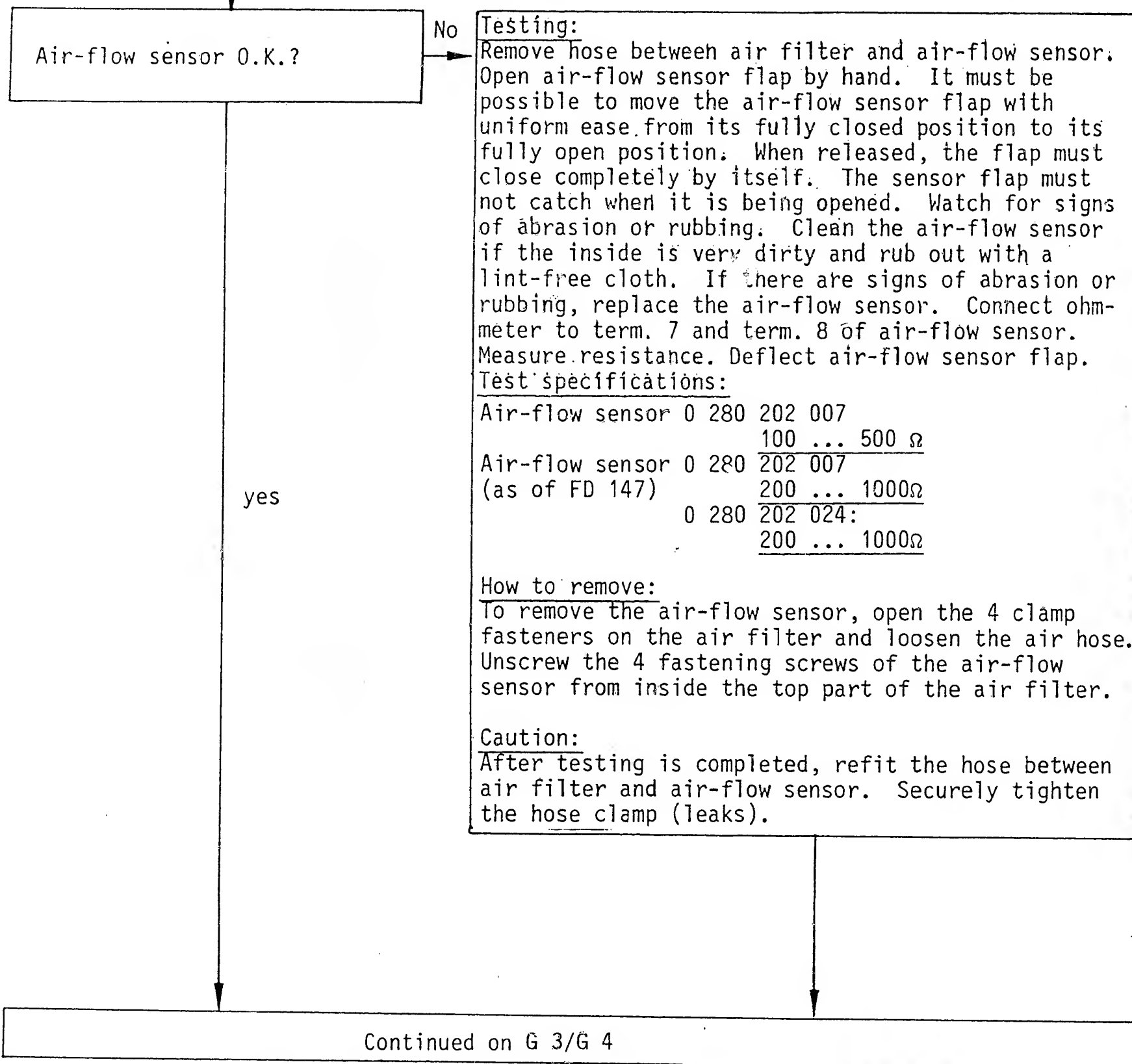
**F24**

Uneven engine idle

Opel Commodore, Senator, Monza

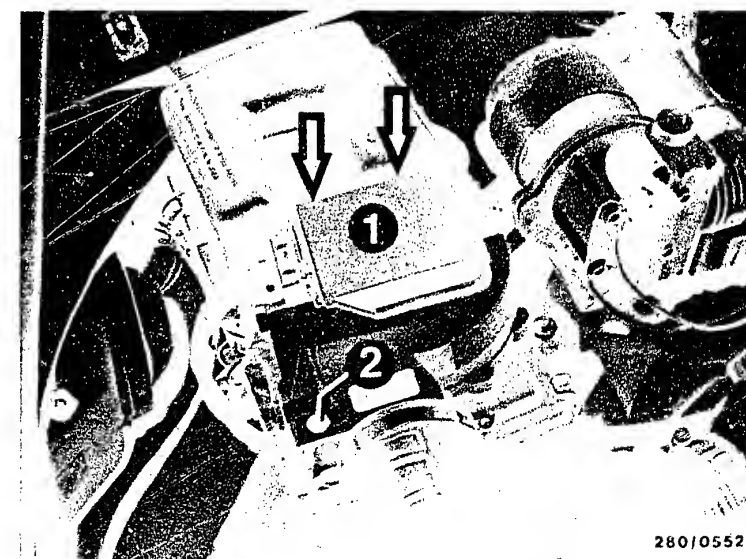


# Uneven engine idle, speed adjustment (idle) and exhaust-gas adjustment (Continued)



Arrow = Opening the air-flow sensor flap

1 = Air-flow sensor  
2 = CO adjusting screw  
Arrows = Fastening screws



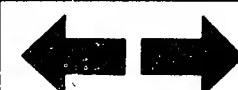
G1

Uneven engine idle  
Opel Commodore, Senator, Monza



G2

Uneven engine idle  
Opel Commodore, Senator, Monza



Uneven engine idle, speed adjustment (idle) and exhaust-gas adjustment  
(Continued)

Are all hose lines and electric leads securely attached?  
Visual examination. Is the air-intake system leak-tight?

No

Check whether hoses of air-intake system and of fuel line system are securely attached, not kinked or damaged. If necessary, replace hoses. Eliminate leaks with new seals or by re-tightening the connecting screws.

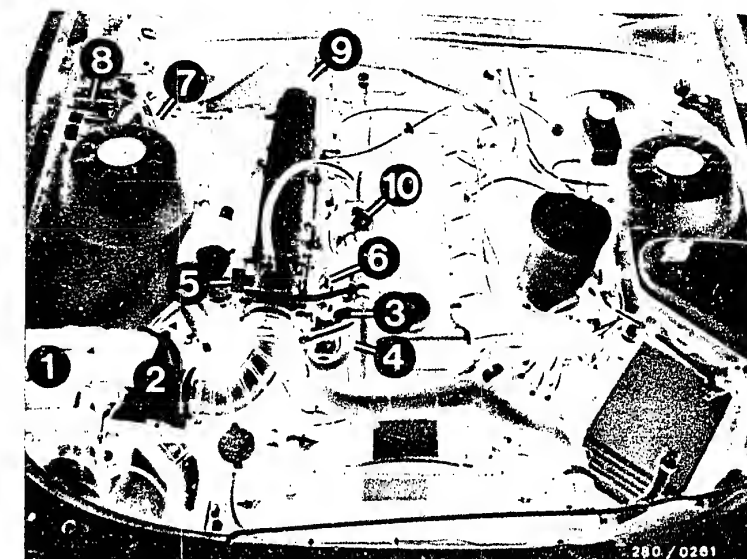
Checking for leaks:

Seal off exhaust tail pipe. Screw off hose from air filter to air-flow sensor on air-flow sensor and seal off air-flow sensor duct. Pull off hose after auxiliary-air device and blow air (0.3 bar) into the intake manifold with a compressed-air gun. Seal off connection port on auxiliary-air device. Open throttle valve fully while doing this. Brush or spray all joints with soapy water. Bubbling or foaming indicates a leak.

Caution!

Reconnect all hoses and securely tighten hose clamps. Check for leaks.  
Check electrical plug-in contacts for loose contacts.

Yes



Overall view of engine

- 1=Air filter
- 2=Air-flow sensor
- 3=Auxiliary-air device
- 4=Temperature sensor II (water)
- 5=Throttle-valve switch
- 6=Injection valves
- 7=Relay set
- 8=Series resistors
- 9=Central ground
- 10=Solenoid-operated air valve

Continued on G 5/G 6

**G3**

Uneven engine idle

Opel Commodore, Senator, Monza



**G4**

Uneven engine idle

Opel Commodore, Senator, Monza





# Uneven engine idle, speed adjustment (idle) and exhaust-gas adjustment (Continued)

CO and idle speed correctly  
adjusted?  
Repeat

no

## CO and idle adjustment

Exhaust-gas test with CO analyzer with engine at  
normal operating temperature and at idle speed

Idle speed 2.5 E engine:

Manually-shifted transmission  $800 \dots 850 \text{ min}^{-1}$

Automatic transmission

(Selector lever in position  
"P")

$800 \dots 850 \text{ min}^{-1}$

Idle speed 3.0 E engine:

Manually-shifted transmission  $850 \dots 900 \text{ min}^{-1}$

Automatic transmission

(Selector lever in position  
"P")

$850 \dots 900 \text{ min}^{-1}$

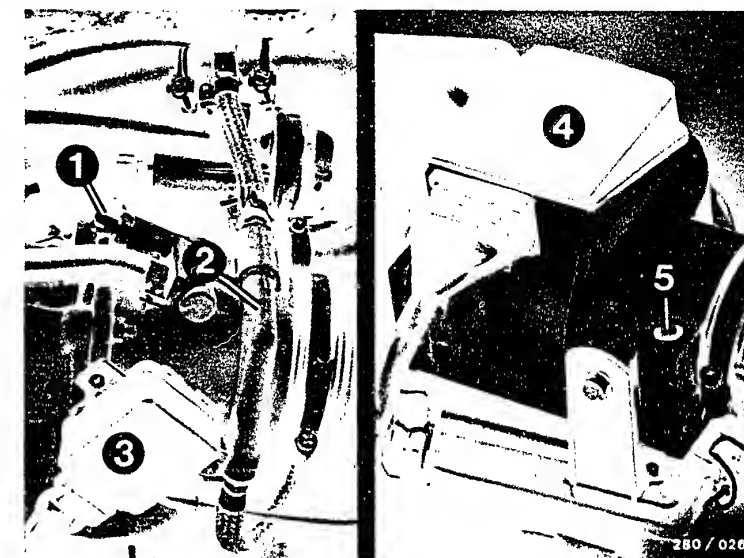
CO setting for both engines:  $\text{max. } 1.0 \% \text{ by vol. CO}$

Let warmed-up engine idle with the air conditioner  
(if fitted) switched off. Connect connecting leads  
on solenoid-operated air valve to battery voltage.  
Idle speed is raised by approx.  $150 \text{ min}^{-1}$ . If there  
is no change in idle speed, replace the solenoid-  
operated air valve. If CO concentration too high,  
turn bypass screw (CO adjusting screw) in air-flow  
sensor half a turn in a counterclockwise direction.  
Test idle speed and CO concentration again. Perform  
corrections in several steps. After adjusting, use  
new plugs.

As of FD 246: CO adjusting screw with hexagon-  
socket-head AF 5.

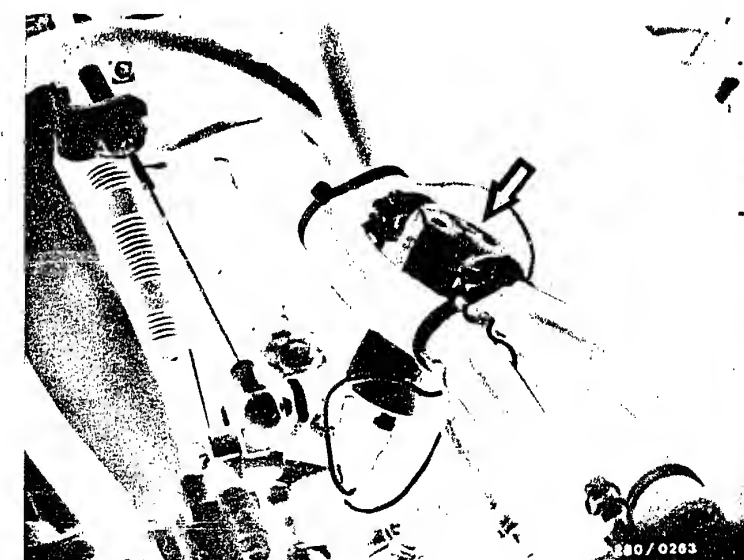
yes

Continued on G 7/G 8



- 1 = Idle-speed-adjusting screw
- 2 = Throttle-valve preheating
- 3 = Throttle-valve switch
- 4 = Air-flow sensor
- 5 = CO adjusting screw

Arrow = Solenoid-operated air  
valve



**G5**

Uneven engine idle

Opel Commodore, Senator, Monza



**G6**

Uneven engine idle

Opel Commodore, Senator, Monza



Uneven engine idle, speed adjustment (idle) and exhaust-gas adjustment  
(Continued)

Testing completed for  
customer complaint

"Uneven engine idle"

Customer complaint  
remedied?

No

Further possibilities:

- Customer complaint incorrectly diagnosed  
(see Coordinates B3...B8).  
If the fault has not been detected by  
"direct trouble-shooting", see "detailed  
trouble-shooting" (Coordinates B3/B4).
- Engine not mechanically O.K.  
(Compression, valve setting, valve timing,  
worn camshaft).

**G7**

Uneven engine idle

Opel Commodore, Senator, Monza



**G8**

Uneven engine idle

Opel Commodore, Senator, Monza





## Trouble-shooting program according to customer complaints

### How to use the following trouble-shooting program

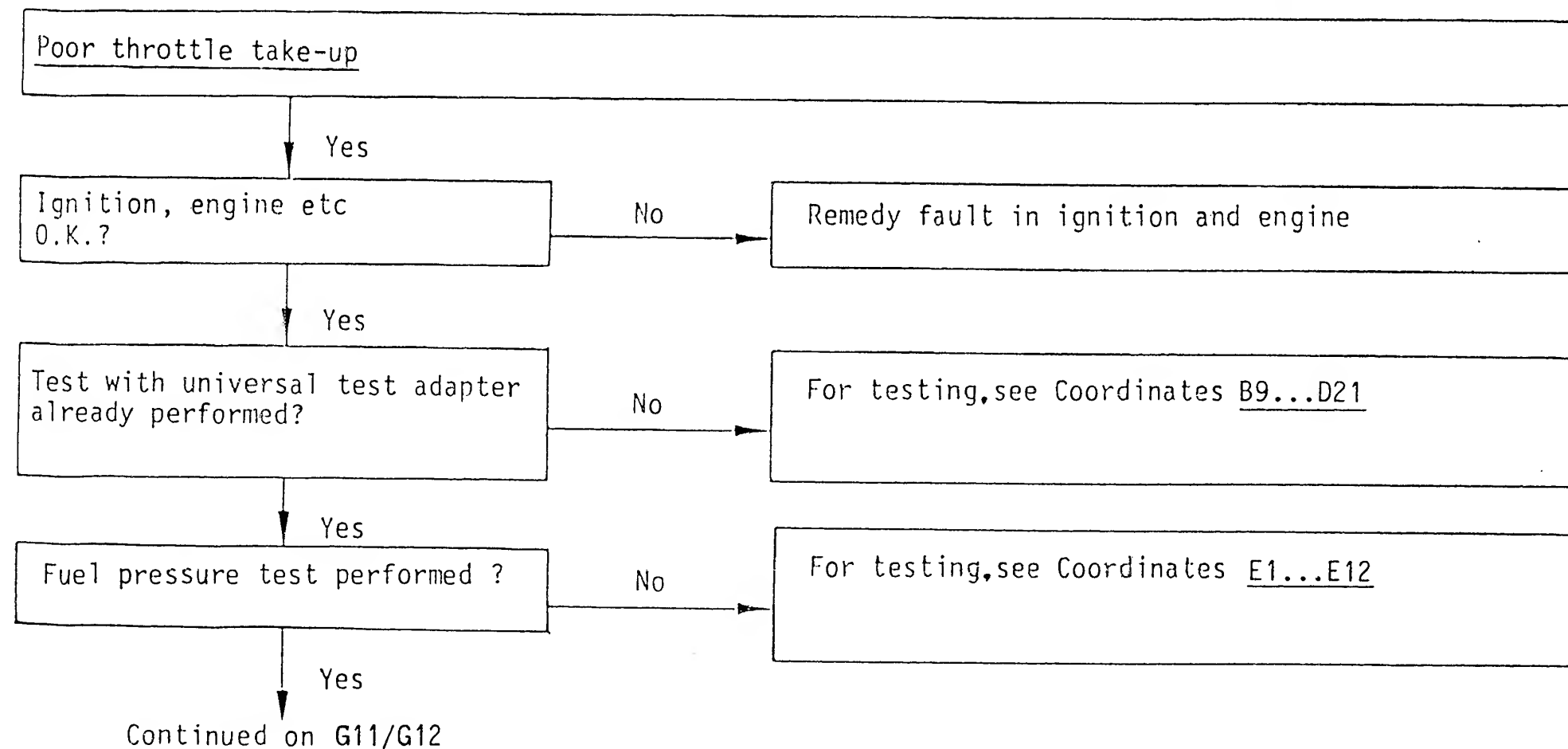
The program is divided into three rows of boxes:

1. The left-hand row contains the questions on the tests.
2. The middle row contains descriptions of the testing and adjustment operations on the components.
3. The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row and carry out the tests given there.

When you have finished testing, continue trouble-shooting at the point at which you branched off.



**G9**

Poor throttle take-up  
Opel Commodore, Senator, Monza



**G10**

Poor throttle take-up  
Opel Commodore, Senator, Monza



# Poor throttle take-up (continued)

Temperature sensors tested?

No

Testing:

Temperature sensor I measures the intake air temperature and is located in the air duct of the air-flow sensor. Measure the following values between term. 27 and term. 6 of air-flow sensor:

At ambient temperature (approx. 15...30°C): 1.45...3.3 kΩ

With engine at normal operating temperature (approx. 80°C): 280...360 Ω

Make direct resistance measurement at temperature sensor II (engine) using ohmmeter. Resistance measurement at term. 13 and term. 49 (ground):

At ambient temperature (approx. 15...30°C): 1.45...3.3 kΩ

With engine at normal operating temperature (approx. 80°C): 280...360 Ω

If incorrect, test the following leads for open circuit or short circuit using ohmmeter:

Temperature sensor I:

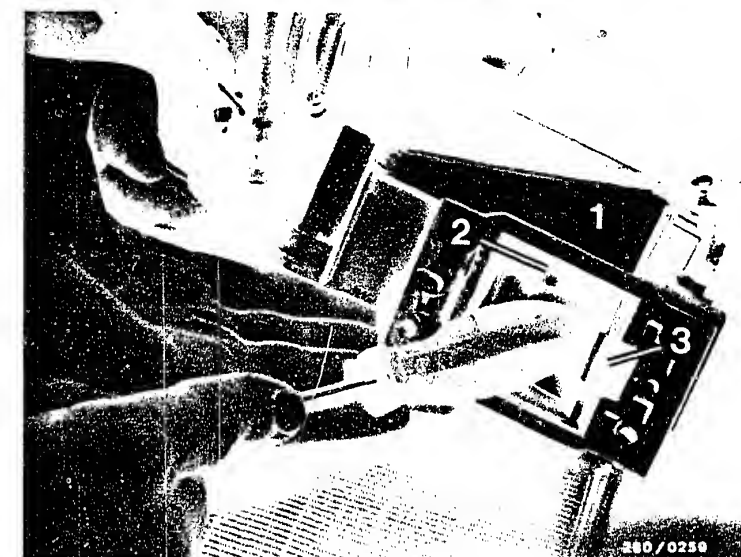
- From multiple plug term. 27 to air-flow sensor term. 27.
- From air-flow sensor term. 6 to multiple plug term. 6

Temperature sensor II:

- From multiple plug term. 13 to temperature sensor II term. 13.
- From temperature sensor II term. 49 to central ground (lead 49).

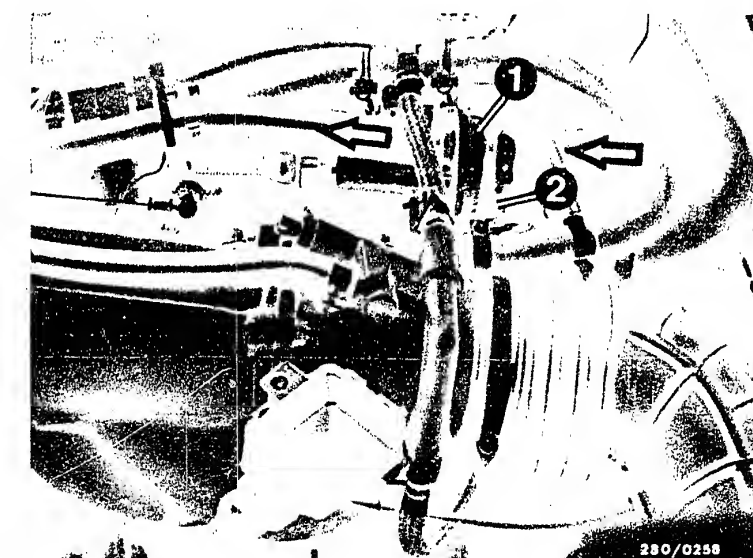
Check all contacts in the plug-in connections.

Yes



- 1 = Air-flow sensor
- 2 = Temperature sensor I (air)
- 3 = Stopper

- 1 = Auxiliary-air device
  - 2 = Temperature sensor II (engine)
- Arrows = Direction of flow



Continued on G 13/G 14

**G11**

Poor throttle take-up

Opel Commodore, Senator, Monza



**G12**

Poor throttle take-up

Opel Commodore, Senator, Monza



Poor throttle take-up (continued)

Solenoid-operated injection valves tested for proper operation?

no

Connect the test lead as follows:

The two-pole plug connectors of the test lead are connected between a solenoid-operated injection valve and its connecting lead. Of the other two terminals of the test lead, only one must be connected to the special input of the motor tester.

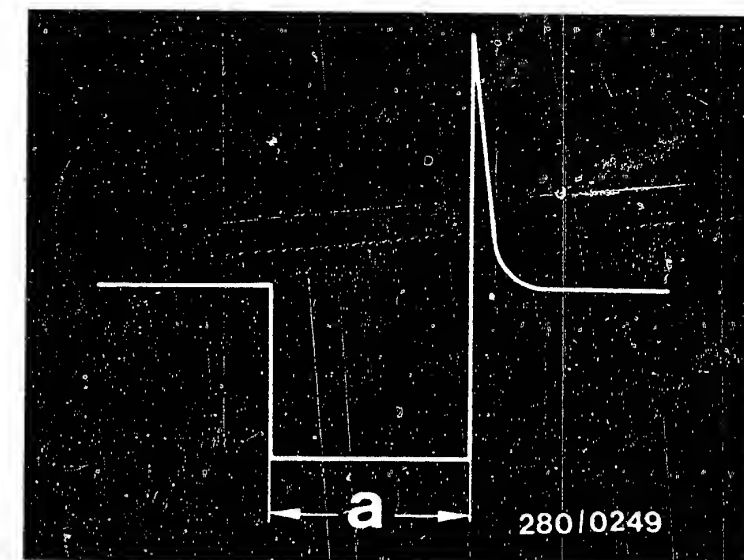
When the correct terminal is connected, the picture opposite can be seen on the oscilloscope.

With the aid of the test lead it is possible with an ignition oscilloscope to test the injection pulses at the injection valves with the engine running. If the picture opposite is not obtained or if there are deviations (interference, missing etc.), the other injection valves should also be tested.

In case of interference → check routing of the leads.  
In case of missing → remedy loose contacts in leads or in plug-in connections.

yes

Continued on G 15/G 16



Injection pulse of a switched output stage

(measured at injection valve)

a = Pulse length

(dependent on engine load)

**G13**

Poor throttle take-up

Opel Commodore, Senator, Monza

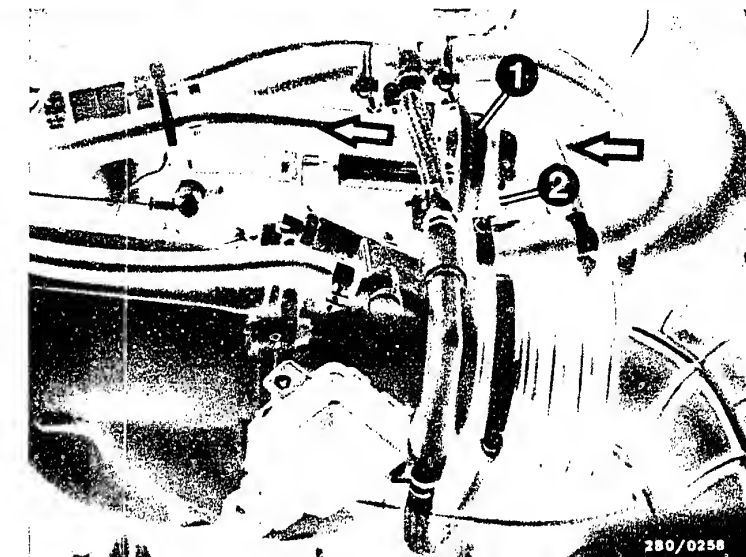
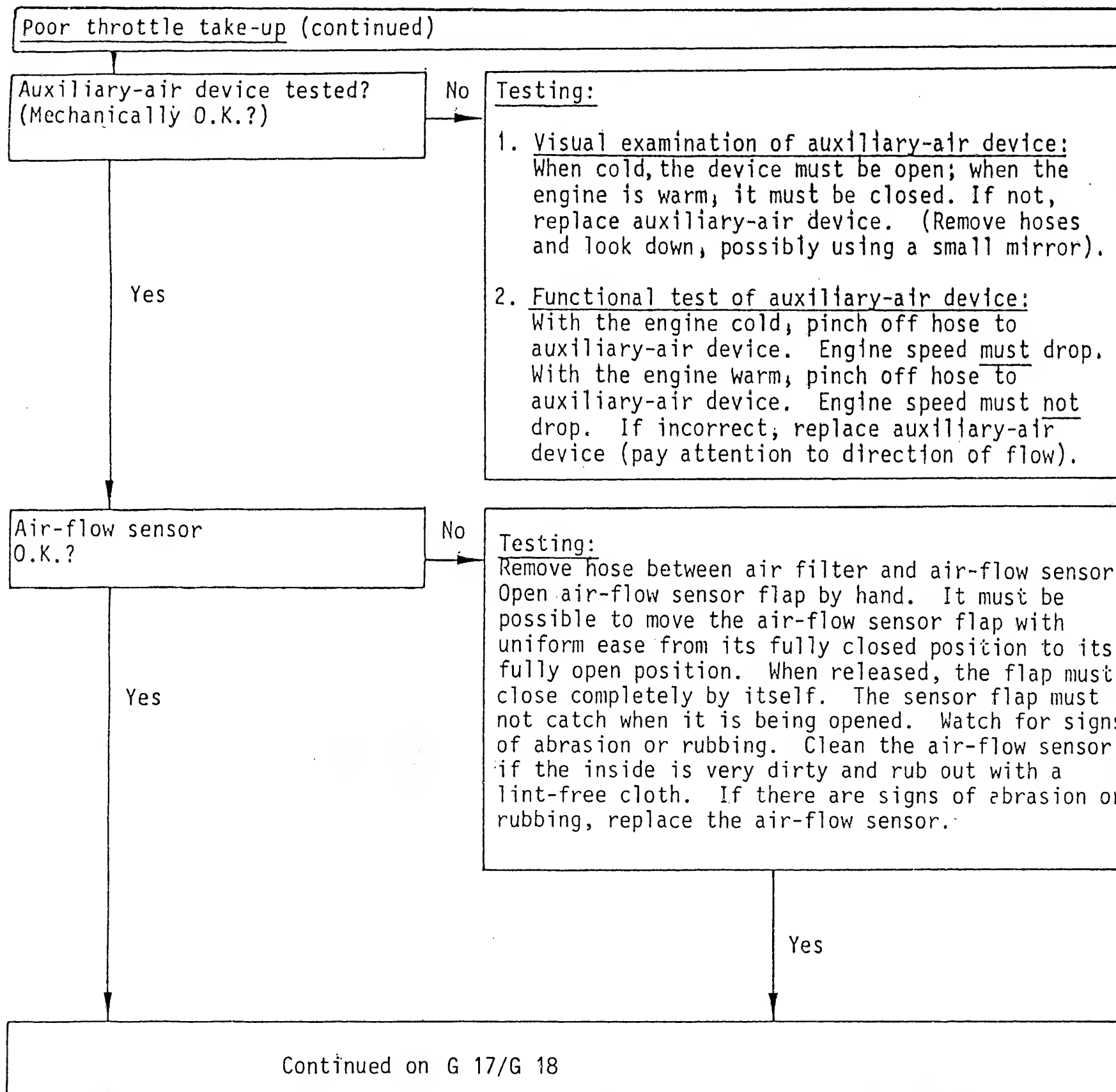


**G14**

Poor throttle take-up

Opel Commodore, Senator, Monza





1 = Auxiliary-air device  
2 = Temperature sensor II  
Arrows = Direction of flow

Arrow = Opening the air-flow sensor flap



# Poor throttle take-up (continued)

yes

## Electrical test:

Remove hose between air filter and air-flow sensor. Connect ohmmeter to term. 7 and term. 8 of air-flow sensor. Measure resistance. Deflect air-flow sensor flap.

## Test specifications:

Air-flow sensor 0 280 202 007:  
100...500Ω

Air-flow sensor 0 280 202 007:  
(as of FD 147):  
200...1000Ω

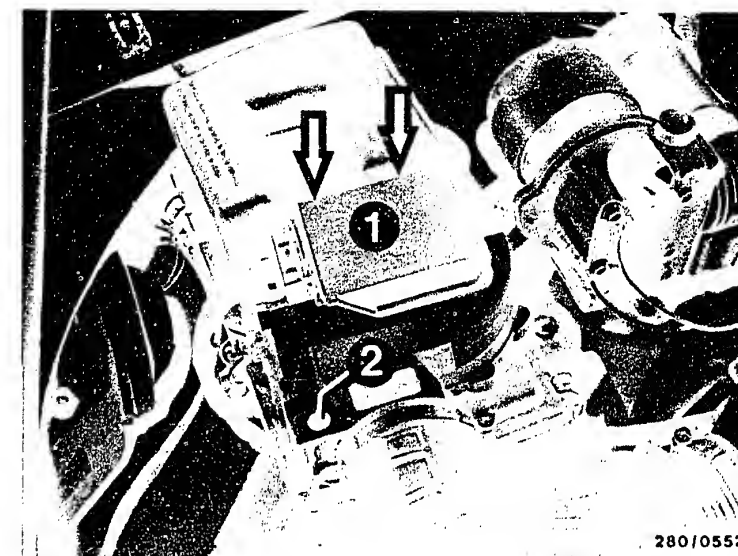
Air-flow sensor 0 280 202 024:  
200...1000Ω

## How to remove:

To remove the air-flow sensor, open the 4 clamp fasteners on the air filter and loosen the air hose. Unscrew the 4 fastening screws of the air-flow sensor from inside the top part of the air filter.

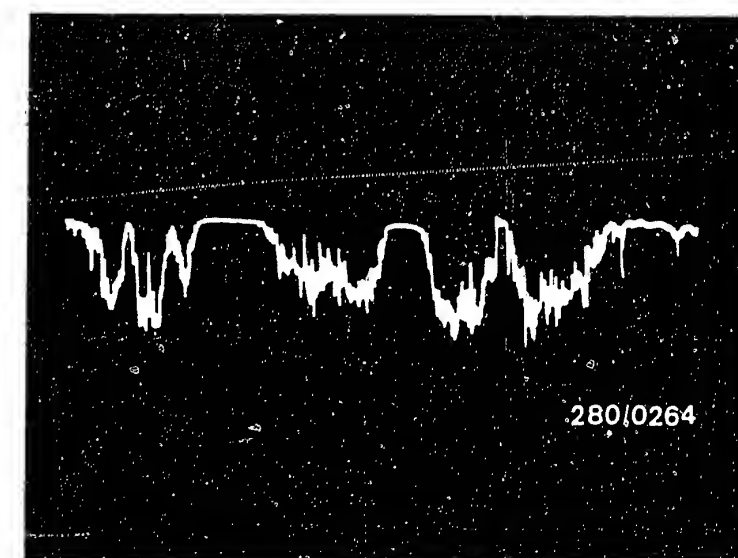
## Potentiometer test (noise test)

Remove hose between air filter and air-flow sensor. Leave plug on. Set motortester to "special input" and, using special cable, connect to air-flow sensor term. 7 (red clip) and term. 6 (black clip). Set control lever for image adjustment on motor-tester as far as it will go to the left (calibrated setting). Ignition "ON", deflect air-flow sensor flap suddenly several times. A continuous stroke signal must be visible on the oscilloscope. If incorrect (see illustration) —> replace air-flow sensor.



1 = Air-flow sensor  
2 = CO adjusting screw  
Arrows = Fastening screws

Incorrect noise signal



Continued on G 19 / G 20

**G 17**

Poor throttle take-up  
Opel Commodore, Senator, Monza



**G 18**

Poor throttle take-up  
Opel Commodore, Senator, Monza



# Poor throttle take-up (continued)

Yes

Are all hose lines and electric leads securely attached? Visual examination. Is the air-intake system leak-tight?

Yes

Continued on G 21/G 22

## Caution!

After testing is completed, the hose between air filter and air-flow sensor must be fitted again. Make sure that hose clamp is tight. Do not bend any terminals in the plug.

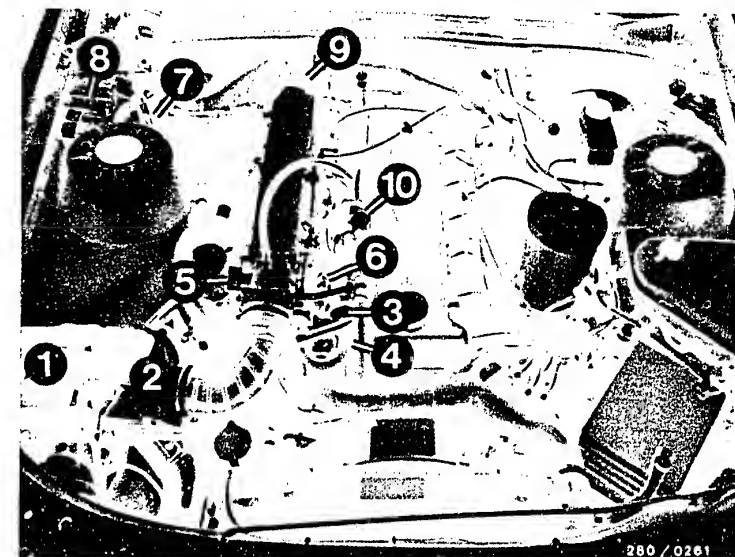
No

Check whether hoses of air-intake system and of fuel line system are securely attached, not kinked or damaged. If necessary, replace hoses. Eliminate leaks with new seals or by re-tightening the connecting screws.

## Checking for leaks:

Seal off exhaust tail pipe. Screw off hose from air filter to air-flow sensor on air-flow sensor and seal off air-flow sensor duct. Pull off hose after auxiliary-air device and blow air (0.3 bar) into the intake manifold with a compressed-air gun. Seal off connection port on auxiliary-air device. Open throttle valve fully while doing this. Brush or spray all joints with soapy water. Bubbling or foaming indicates a leak.

Check electric contacts for loose connection.



- 1 = Air filter
- 2 = Air-flow sensor
- 3 = Auxiliary-air device
- 4 = Temperature sensor II (water)
- 5 = Throttle-valve switch
- 6 = Injection valves
- 7 = Relay set
- 8 = Series resistors
- 9 = Central ground
- 10 = Solenoid-operated air valve

**G19**

Poor throttle take-up

Opel Commodore, Senator, Monza



**G20**

Poor throttle take-up

Opel Commodore, Senator, Monza





# Poor throttle take-up (continued)

Throttle valve closed?

No

## Testing:

Throttle valve closed?

Check whether the throttle valve can be closed still further and whether the engine speed thereby drops.

Adjustment:

Throttle valve must be set just before it sticks with the throttle-valve stop screw. Straighten throttle linkage if bent.

Yes

CO and idle speed correctly adjusted?

No

## CO and idle adjustment

Exhaust-gas test with CO analyzer with engine at normal operating temperature and at idle speed

Idle speed 2.5 E engine:

Manually-shifted transmission  $800 \dots 850 \text{ min}^{-1}$

Automatic transmission

(Selector lever in position "p")

$800 \dots 850 \text{ min}^{-1}$

Idle speed 3.0 E engine:

Manually-shifted transmission  $850 \dots 900 \text{ min}^{-1}$

Automatic transmission

(Selector lever in position "p")

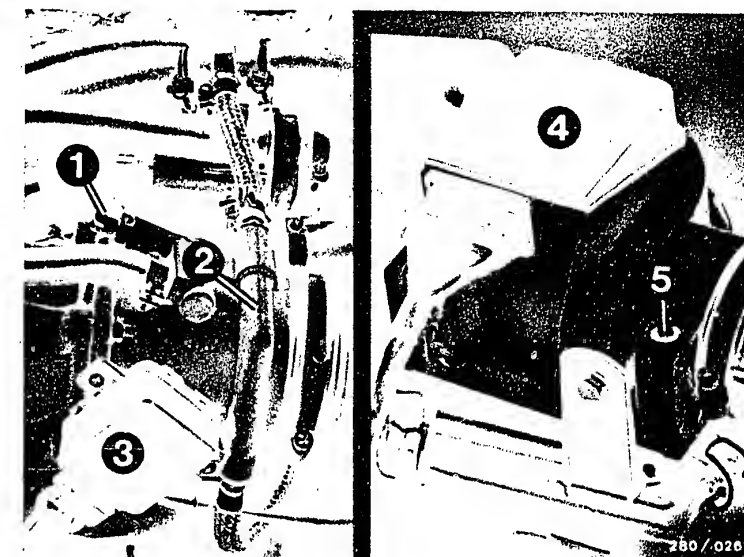
$850 \dots 900 \text{ min}^{-1}$

CO setting for both engines:  $\text{max. } 1.0 \% \text{ by vol. CO}$

Let warmed-up engine idle with the air conditioner (if fitted) switched off. Connect connecting leads on solenoid-operated air valve to battery voltage. Idle speed is raised by approx.  $150 \text{ min}^{-1}$ . If there is no change in idle speed, replace the solenoid-operated air valve.

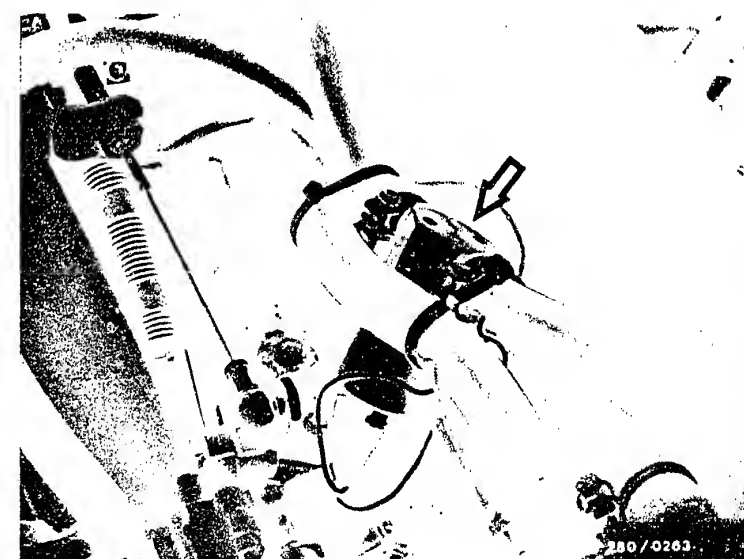
Yes

Continued on G 23/G 24



- 1 = Idle-speed-adjusting screw
- 2 = Throttle-valve preheating
- 3 = Throttle-valve switch
- 4 = Air-flow sensor
- 5 = CO adjusting screw

Arrow = Solenoid-operated air valve



**G21**

Poor throttle take-up

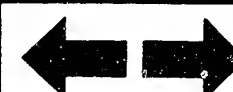
Opel Commodore, Senator, Monza

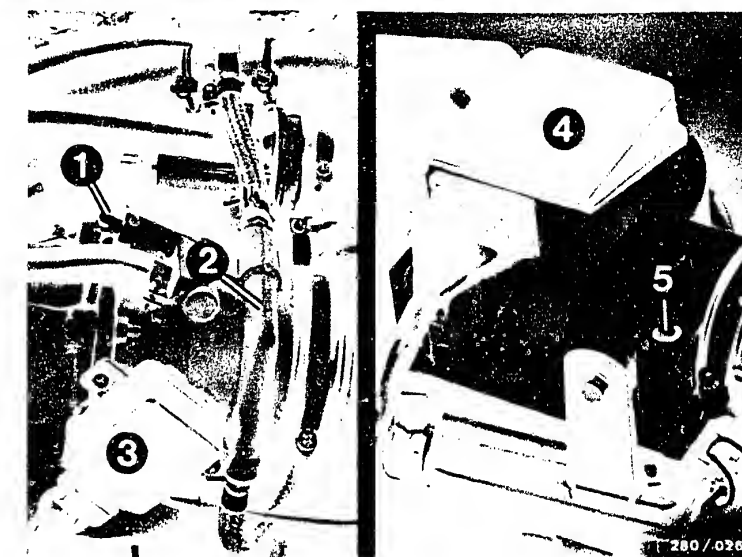
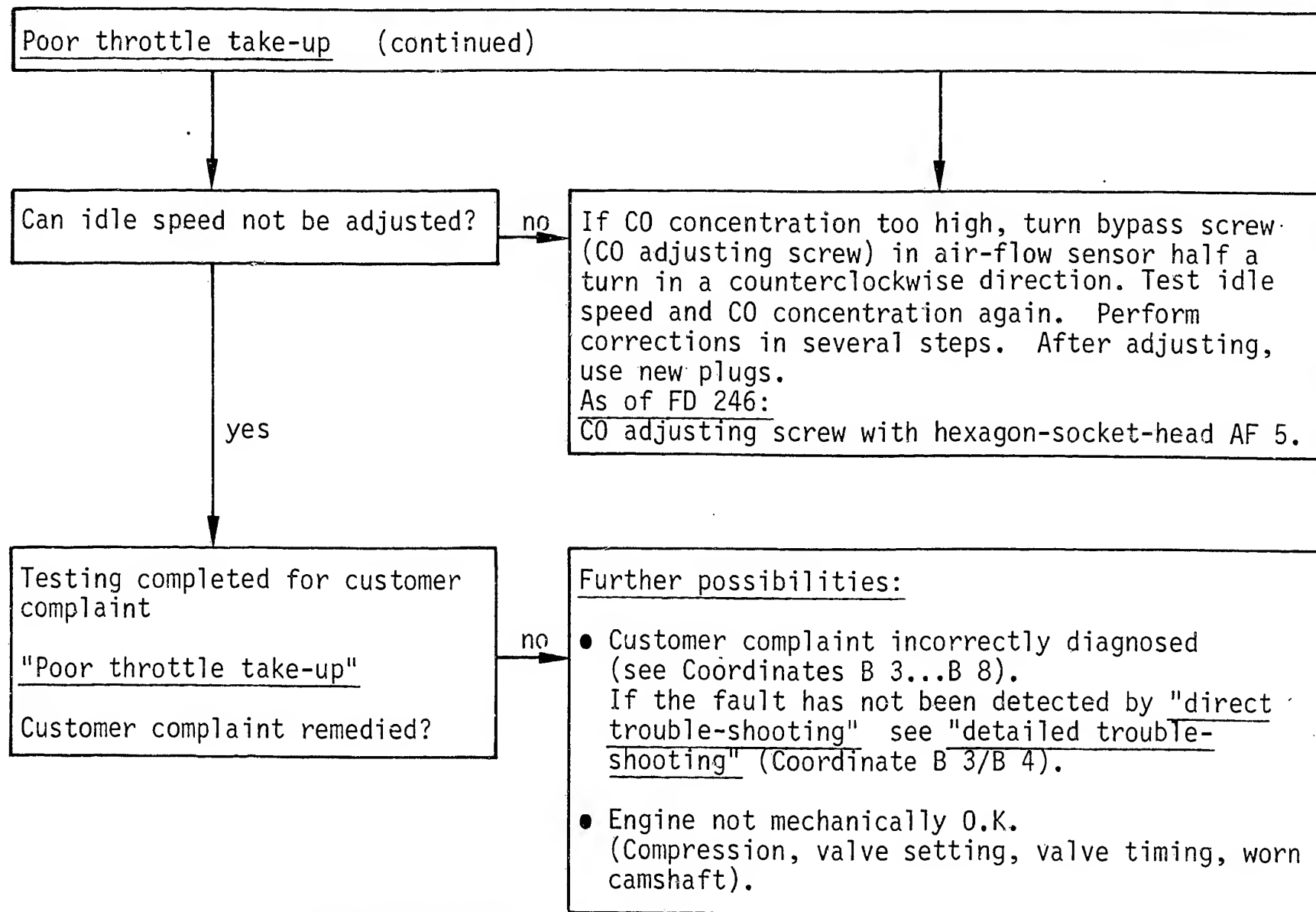


**G22**

Poor throttle take-up

Opel Commodore, Senator, Monza





- 1 = Idle-speed adjusting screw
- 2 = Throttle-valve preheating
- 3 = Throttle-valve switch
- 4 = Air-flow sensor
- 5 = CO adjusting screw





## Trouble-shooting program according to customer complaints

### How to use the following trouble-shooting program

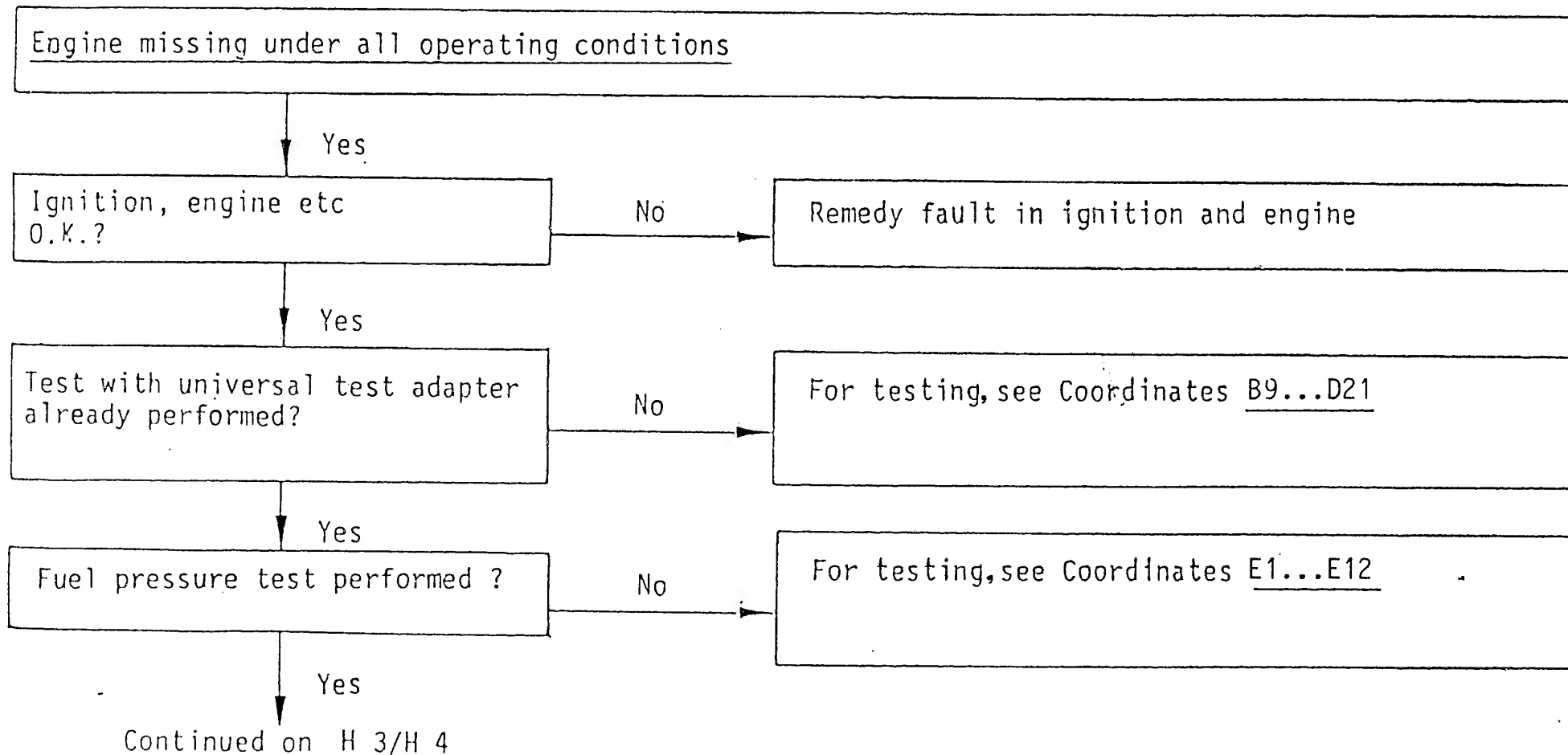
The program is divided into three rows of boxes:

1. The left-hand row contains the questions on the tests.
2. The middle row contains descriptions of the testing and adjustment operations on the components.
3. The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row and carry out the tests given there.

When you have finished testing, continue trouble-shooting at the point at which you branched off.



**H1**

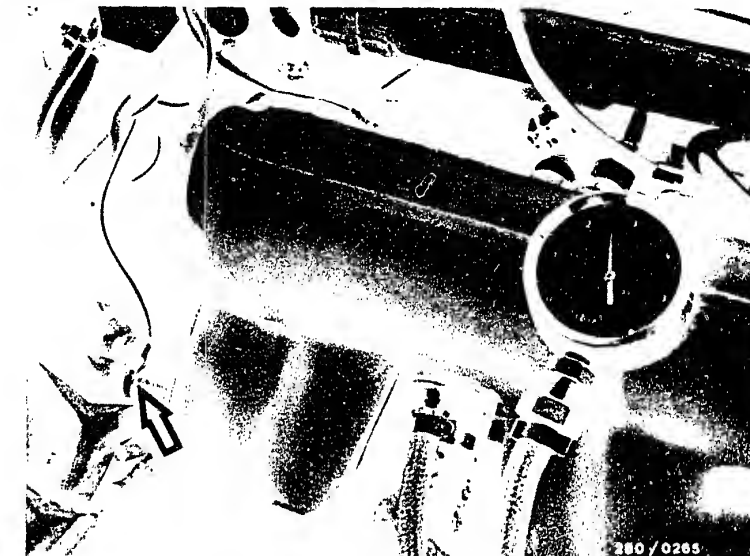
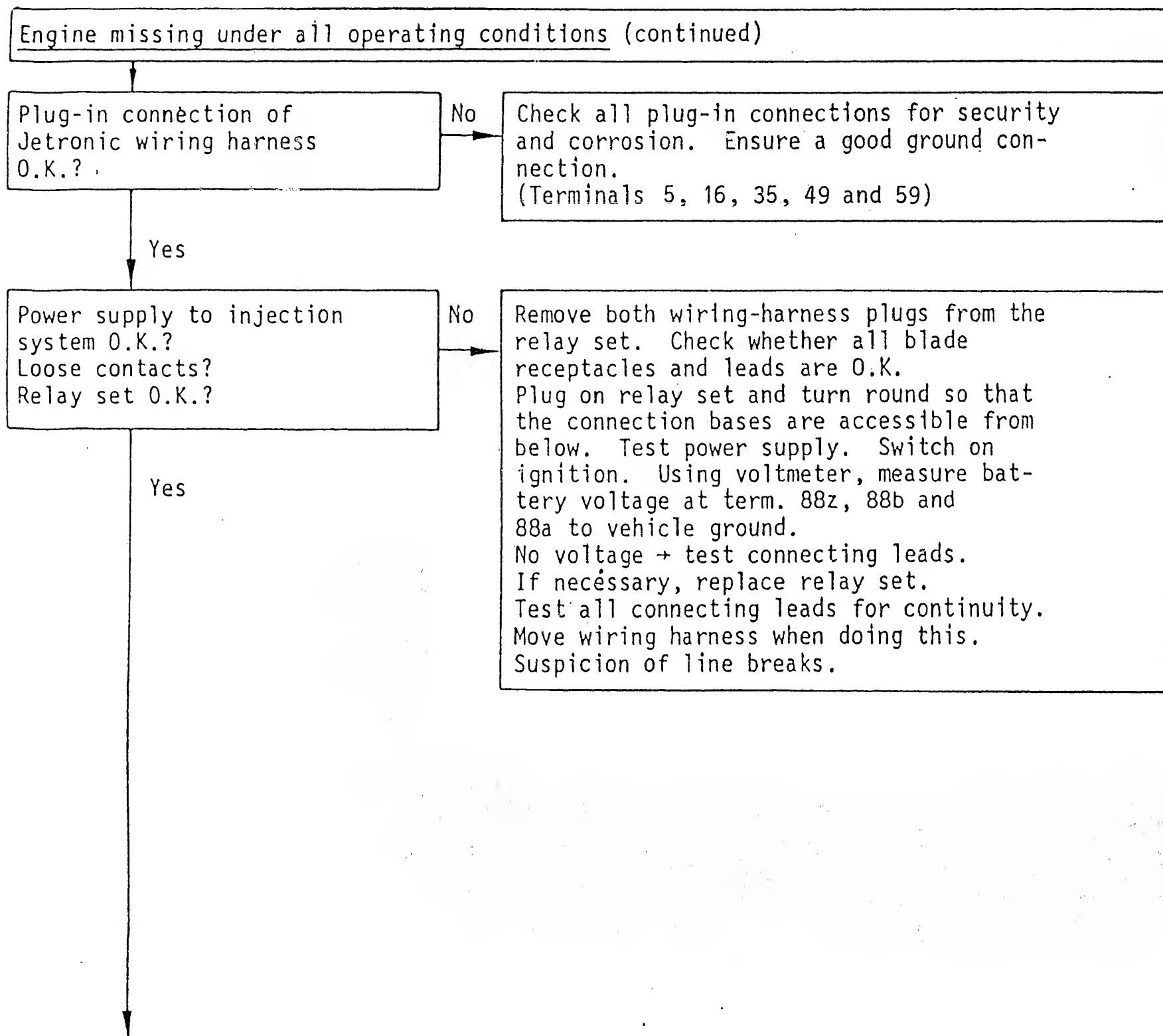
Engine missing under all operating cond.  
Opel Commodore, Senator, Monza



**H2**

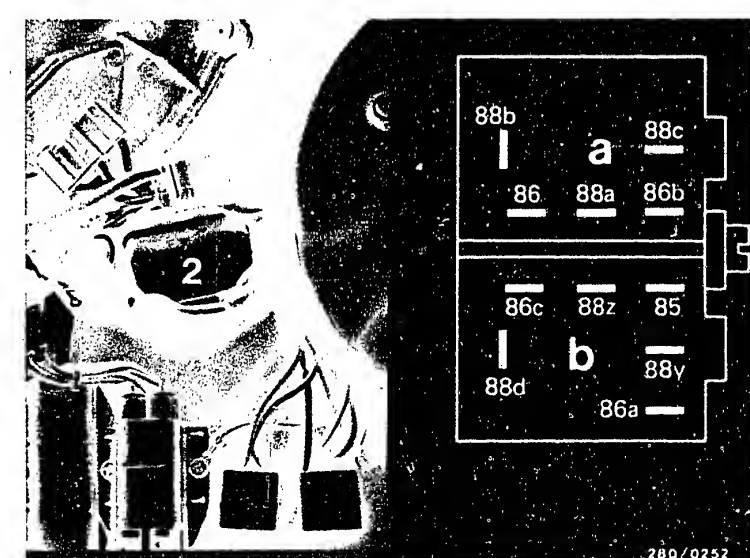
Engine missing under all operating cond.  
Opel Commodore, Senator, Monza





Arrow = Central ground

Connection bases (viewed from below)  
2 = Relay set



Continued on H 5/H 6

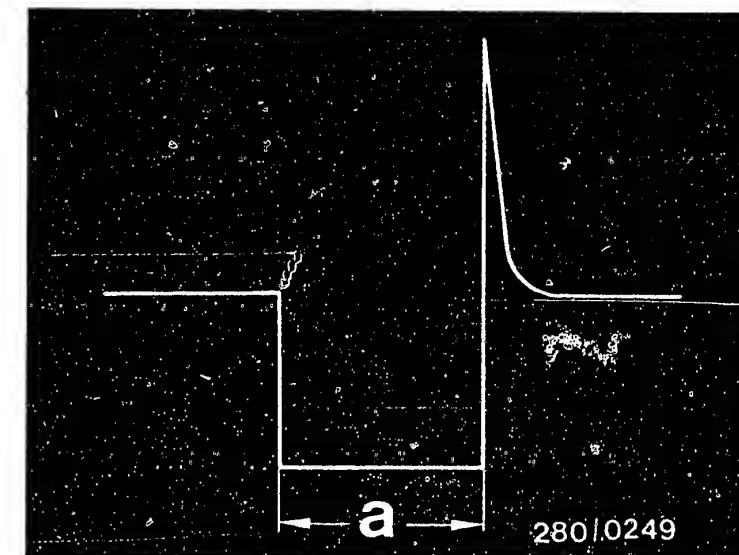
Engine missing under all operating conditions (continued)

Generator with regulator O.K.?  
(Engine missing due to voltage peaks).

no

Connect the test lead as follows:  
The two-pole plug connectors of the test lead are connected between a solenoid-operated injection valve and its connecting lead. Of the other two terminals of the test lead, only one must be connected to the special input of the motortester.  
When the correct terminal is connected, the picture opposite can be seen on the oscilloscope.  
With the aid of the test lead it is possible with an ignition oscilloscope to test the injection pulses at the injection valves with the engine running.  
If the picture opposite is not obtained or if there are deviations (interference, missing etc.), the other injection valves should also be tested.  
With the engine stopped, remove the plug from the alternator. Start the engine. If missing stops, test the alternator and regulator. Voltage peaks are visible on the ignition oscilloscope.  
In case of interference + check routing of the leads.  
In case of missing + remedy loose contacts in leads or in plug-in connections.

yes

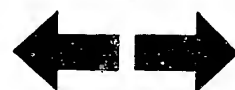


Injection pulse of a switched output stage  
(measured at injection valve)  
a = Pulse length  
(dependent on engine load)

Continued on H 7/H 8

**H5**

Engine missing under all operating cond.  
Opel Commodore, Senator, Monza



**H6**

Engine missing under all operating cond.  
Opel Commodore, Senator, Monza



Engine missing under all operating conditions (continued)

Air-flow sensor O.K.?

no

Testing:

Remove hose between air filter and air-flow sensor. Open air-flow sensor flap by hand. It must be possible to open the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. When released, the flap must close completely by itself. Air-flow sensor flap must not catch when it is being opened. Watch for signs of abrasion or rubbing. Clean the air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are signs of abrasion or rubbing, replace the air-flow sensor. Connect ohmmeter to term. 7 and term. 8 of air-flow sensor. Measure resistance. Deflect air-flow sensor flap. Test specifications:

Air-flow sensor

0 280 202 007:  
100...500  $\Omega$

Air-flow sensor  
(as of FD 147):

0 280 202 007  
200...1000  $\Omega$

Air-flow sensor

0 280 202 024  
200...1000  $\Omega$

How to remove:

To remove the air-flow sensor, open the 4 clamp fasteners on the air filter and loosen the air hose. Unscrew the 4 fastening screws of the air-flow sensor from inside the top part of the air filter.

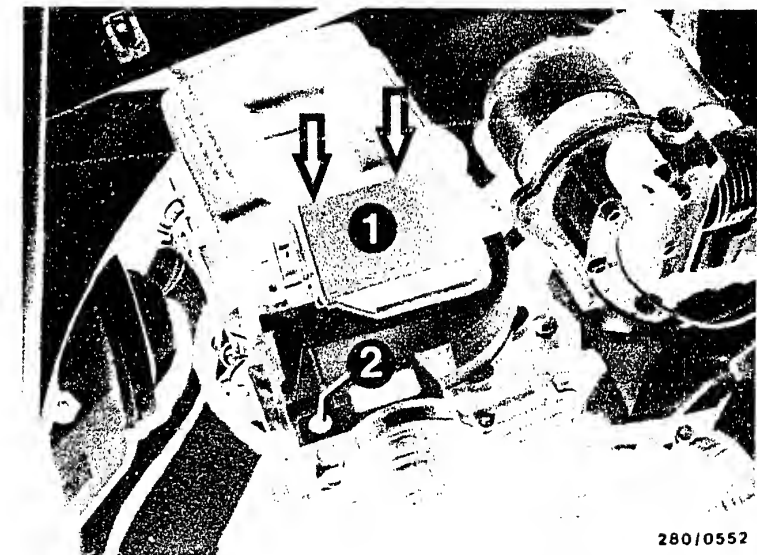
yes

Continued on H 9 / H 10



Arrow = Opening the air-flow sensor flap

1 = Air-flow sensor  
2 = CO adjusting screw  
Arrows = Fastening screws



**H7**

Engine missing under all operating cond.  
Opel Commodore, Senator, Monza



**H8**

Engine missing under all operating cond.  
Opel Commodore, Senator, Monza



Engine missing under all operating conditions (continued)

Checking the pump contact:

1. Remove plug from air-flow sensor. Measure resistance with ohmmeter between term. 36 and term. 39. Deflect air-flow sensor flap. Set value approx.  $0\ \Omega$ .

2. Air-flow sensor as of FD 051:

Engine stopped while hot

Remove plug from air-flow sensor and connect ohmmeter to term. 6 and term. 36. Positive pole of ohmmeter to term. 6 = approx.  $0\ \Omega$ . With reverse polarity: approx  $\infty\ \Omega$ .

If readings incorrect  $\longrightarrow$  replace air-flow sensor.  
Potentiometer test (noise test)

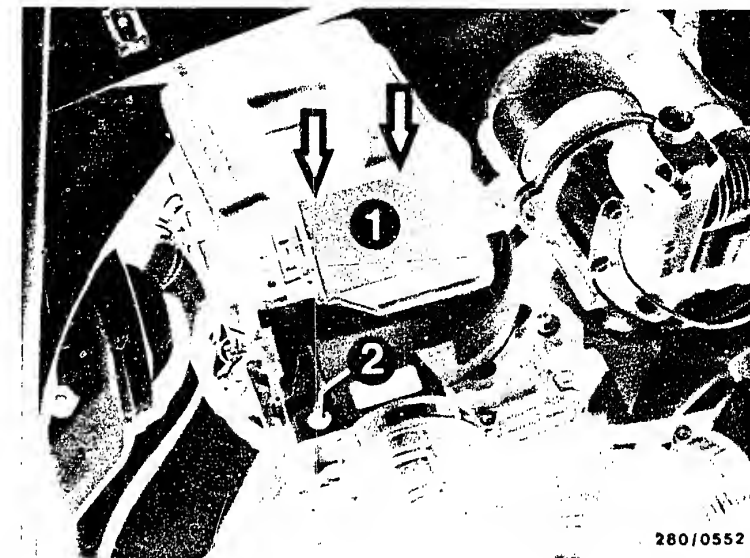
Remove hose between air filter and air-flow sensor. Leave plug on. Set motortester to "special input" and, using special cable, connect to air-flow sensor term. 7 (red clip) and term. 6 (black clip). Set control lever for image adjustment on motor-tester as far as it will go to the left (calibrated setting). Ignition "ON", deflect air-flow sensor flap suddenly several times. A continuous stroke signal must be visible on the oscilloscope. If incorrect (see Illustration)  $\longrightarrow$  replace air-flow sensor.

Caution:

After testing is completed, refit the hose between air filter and air-flow sensor. Securely tighten hose clamp (leaks). Do not bend any terminals in the plug.

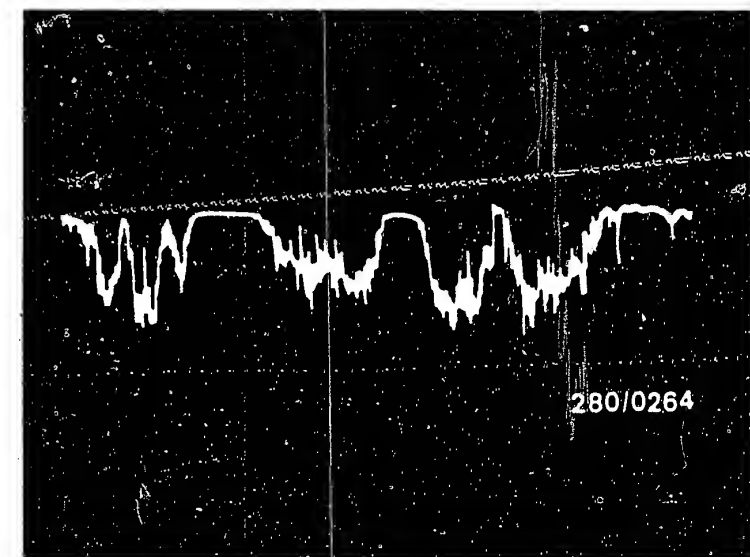
yes

Continued on H 11 / H 12



1 = Air-flow sensor  
2 = CO adjusting screw  
Arrows = Fastening screws

Incorrect noise signal



H9

Engine missing under all operating cond.  
Opel Commodore, Senator, Monza



H10

Engine missing under all operating cond.  
Opel Commodore, Senator, Monza



# Engine missing under all operating conditions (Continued)

Fuel delivery O.K.?

Yes

No

## Measuring the fuel delivery:

For testing, undo the junction between the fuel return hose (from pressure regulator) and fuel return line (to fuel tank). If necessary, extend hose and lead into a 5 l vessel with graduated scale.

Remove air hose to air filter on air-flow sensor. Open air-flow sensor flap by hand until pump operates.

## Test specification

2.5 E engine: min. 750 cm<sup>3</sup>/30 s

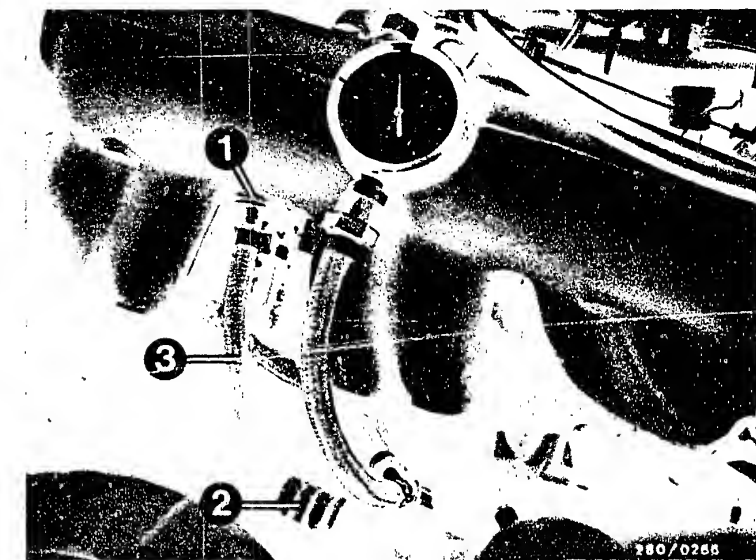
3.0 E engine: min. 850 cm<sup>3</sup>/30 s

Remedy if test specification not reached:

- Fuel filter clogged → Replace
- Voltage at fuel pump plugs, with engine running min. 12 V. If not, clean contacts, possibly eliminating poor ground connection. Replace leads.
- Fuel-pressure regulator defective → replace
- Fuel pump delivery too low → replace fuel pump.

## Caution!

After testing is completed, refit the hose between air filter and air-flow sensor. Securely tighten hose clamp. Check for leaks.



1 = Pressure regulator

2 = Fuel return line

3 = Fuel return hose

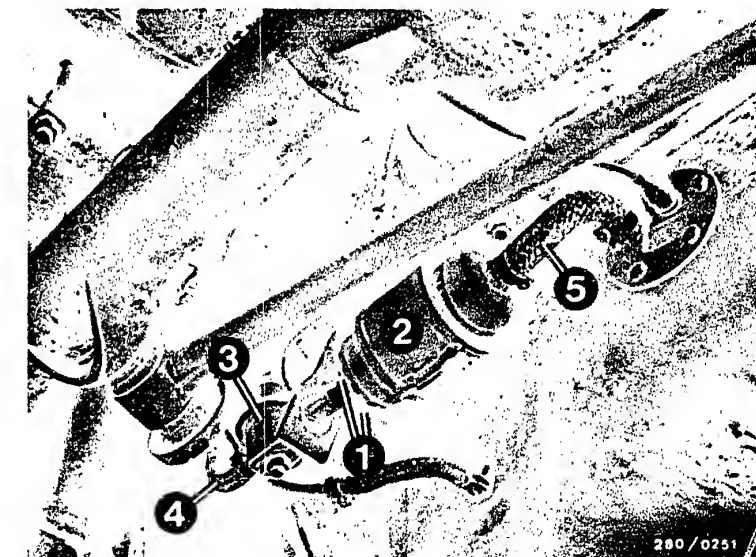
1 = Electric terminals

2 = Electric fuel pump

3 = Fuel-line-pressure damper

4 = Fuel delivery line

5 = Fuel inlet line



Control unit O.K.?

Yes

No

Let engine run. Shake control unit lightly and move multiple plug. Watch for engine missing. Repair plug-in connection at multiple plug or replace defective control unit.

Continued on H 13/H 14

H11

Engine missing under all operating cond.

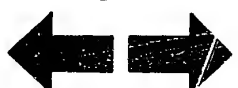
Opel Commodore, Senator, Monza



H12

Engine missing under all operating cond.

Opel Commodore, Senator, Monza





# Engine missing under all operating conditions (Continued)

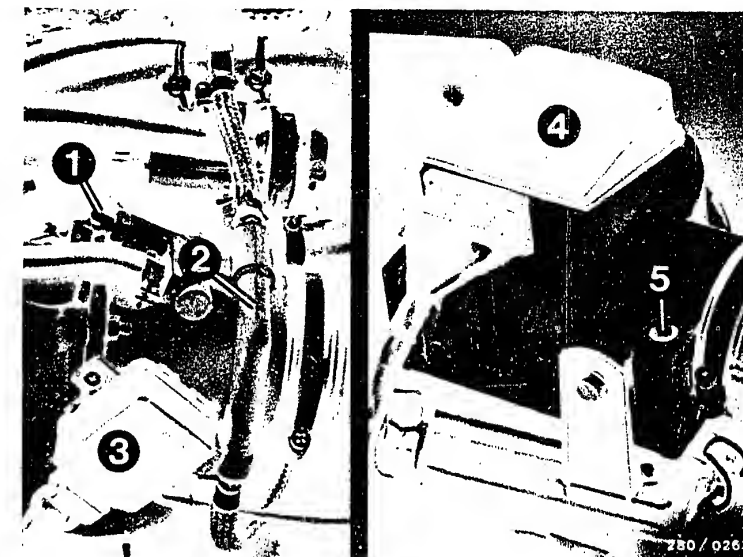
Burbling on the overrun?  
Throttle valve closed?  
CO and idle adjustment O.K.?

No

Yes

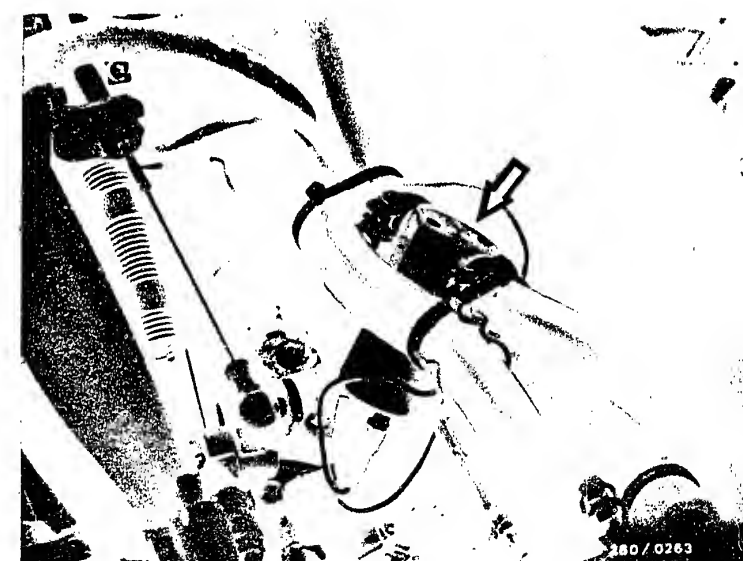
1. Check the exhaust system for leaks.
2. Throttle valve closed?  
Check whether the throttle valve can be closed still further and whether the engine speed thereby drops.  
Adjustment:  
Throttle valve must be set just before it sticks with the throttle-valve stop screw. Straighten throttle linkage if bent.
3. CO and idle adjustment  
Exhaust-gas test with CO analyzer with engine at normal operating temperature and at idle speed  
Idle speed 2.5 E engine:  
Manually-shifted transmission  $800 \dots 850 \text{ min}^{-1}$   
Automatic transmission  
(Selector lever in position "p")  $800 \dots 850 \text{ min}^{-1}$   
Idle speed 3.0 E engine:  
Manually-shifted transmission  $850 \dots 900 \text{ min}^{-1}$   
Automatic transmission  
(Selector lever in position "p")  $850 \dots 900 \text{ min}^{-1}$   
CO setting for both engines:  $\frac{\text{max. } 1.0 \% \text{ by vol. CO}}$   
Let warmed-up engine idle with the air conditioner (if fitted) switched off. Connect connecting leads on solenoid-operated air valve to battery voltage. Engine speed is increased by approx.  $150 \text{ min}^{-1}$ . If there is no change in engine speed, replace the solenoid-operated air valve.  
As of FD 246: CO adjusting screw with hexagon-socket-head AF 5.

Continued on H 15/H 16



- 1 = Idle-speed-adjusting screw
- 2 = Throttle-valve preheating
- 3 = Throttle-valve switch
- 4 = Air-flow sensor
- 5 = CO adjusting screw

Arrow = Solenoid-operated air valve



**H13**

Engine missing under all operating cond.  
Opel Commodore, Senator, Monza



**H14**

Engine missing under all operating cond.  
Opel Commodore, Senator, Monza





Engine missing under all operating conditions (continued)

Testing completed for  
customer complaint

"Engine missing under all  
operating conditions"

Customer complaint remedied?

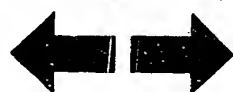
No

Further possibilities:

- Customer complaint incorrectly diagnosed (see Coordinates B3...B8). If the fault has not been detected by "direct trouble-shooting", see "detailed trouble-shooting" (Coordinates B3/B4).
- Engine not mechanically O.K. (Compression, valve setting, valve timing, worn camshaft).

**H15**

Engine missing under all operating cond.  
Opel Commodore, Senator, Monza



**H16**

Engine missing under all operating cond.  
Opel Commodore, Senator, Monza



## Trouble-shooting program according to customer complaints

### How to use the following trouble-shooting program

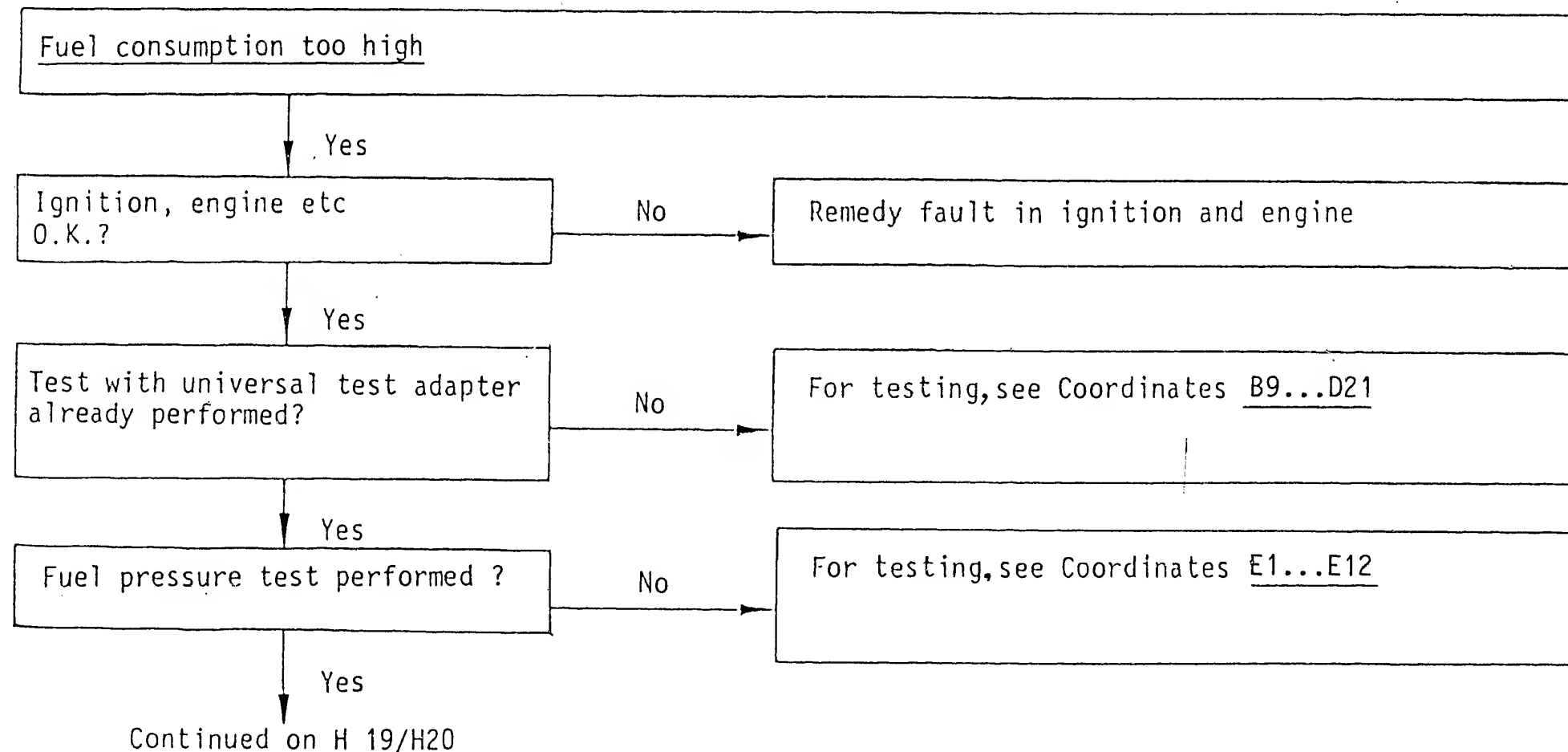
The program is divided into three rows of boxes:

1. The left-hand row contains the questions on the tests.
2. The middle row contains descriptions of the testing and adjustment operations on the components.
3. The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row and carry out the tests given there.

When you have finished testing, continue trouble-shooting at the point at which you branched off.

**H17**

Fuel consumption too high  
Opel Commodore, Senator, Monza

**H18**

Fuel consumption too high  
Opel Commodore, Senator, Monza



## Fuel consumption too high (continued)

Temperature sensors tested?

No

Testing:

Temperature sensor I measures the intake air temperature and is located in the air duct of the air-flow sensor. Measure the following values between term. 27 and term. 6 of air-flow sensor:

At ambient temperature  
(approx. 15...30°C): 1.45...3.3 kΩ

With engine at normal operating temperature  
(approx. +80°C): 200...360 Ω

Make direct resistance measure at temperature sensor II (engine) using ohmmeter. Resistance measurement at term. 13 and term. 49 (ground):

At ambient temperature  
(approx. +15°...+30°C): 1.45...3.3 kΩ

With engine at normal operating temperature  
(approx. +80°C): 280...360 Ω

If incorrect, test the following leads for open circuit or short circuit using ohmmeter:

Temperature sensor I:

- From multiple plug term. 27 to air-flow sensor term. 27.
- From air-flow sensor term. 6 to multiple plug term. 6

Temperature sensor II:

- From multiple plug term. 13 to temperature sensor II term. 13.
- From temperature sensor II term. 49 to central ground (lead 49).

Check all contacts in the plug-in connections.

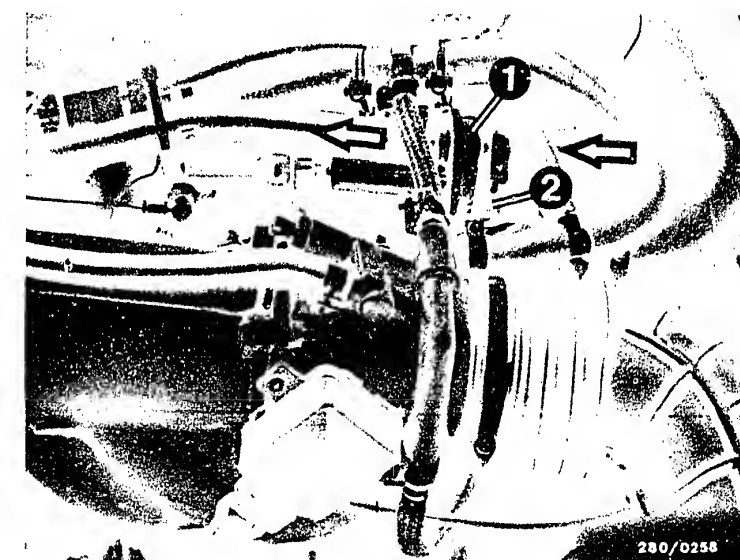
Yes

Continued on H21/H 22



- 1 = Air-flow sensor  
2 = Temperature sensor I  
3 = Stopper

- 1 = Auxiliary-air device  
2 = Temperature sensor II(engine)  
Arrows = Direction of flow



**H19**

Fuel consumption too high  
Opel Commodore, Senator, Monza



**H20**

Fuel consumption too high  
Opel Commodore, Senator, Monza



## Fuel consumption too high (continued)

Injection valves mechanically O.K.?

no

With the engine running, disconnect injection valve connectors individually, one after the other, from the injection valves and plug on again. Engine speed must drop if injection valve is O.K.  
Test the following connecting leads for continuity:

- From relay set term. 88b to series resistor term. 43 and 43/2.
- From series resistor through the injection valves to control unit term. 14, 15, 30, 31, 32 and 33.

If necessary, replace leads, series resistor or injection valves.

yes

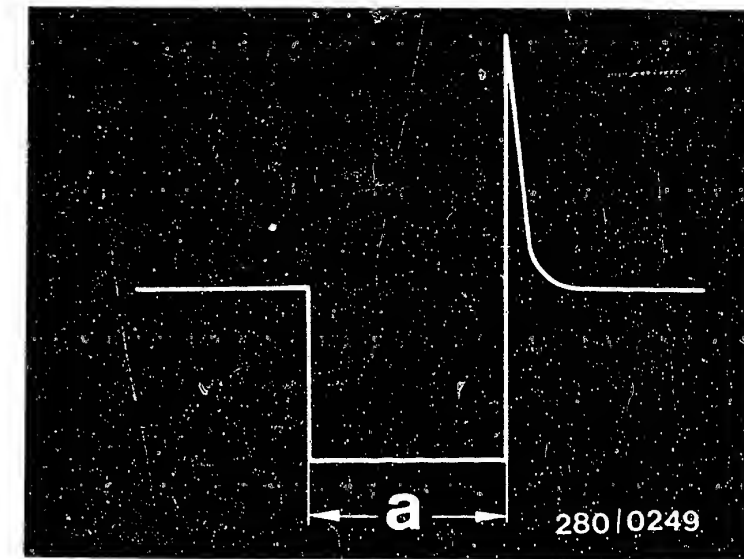
Injection valves checked for proper operation?

no

Connect test leads as follows:  
The two-pole plug-in connections of the test lead are connected between an injection valve and its connecting lead. Of the other two connection clamps of the test lead, only one connection clamp must be connected to the special input of the motor tester.  
If the correct connection is made, the picture opposite is visible on the oscilloscope.  
With the aid of the test lead it is possible with an ignition oscilloscope to test the injection pulses at the injection valves with the engine running.  
If the picture shown opposite is not obtained or if there are deviations (interference, missing etc.), the other injection valves should also be tested.  
In case of interference —> check routing of leads.  
In case of missing —> eliminate loose contacts in leads or in plug-in connections.

yes

Continued on H 23 / H 24



Injection pulses of a switched output stage  
(measured at injection valve)  
a = Pulse length  
(dependent on engine load)

**H21**

Fuel consumption too high  
Opel Commodore, Senator, Monza



**H22**

Fuel consumption too high  
Opel Commodore, Senator, Monza



## Fuel consumption too high (continued)

Air-flow sensor O.K.?

no

### Testing:

Remove hose between air filter and air-flow sensor. Open air-flow sensor flap by hand. It must be possible to move the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. When released, the flap must close completely by itself. The sensor flap must not catch when it is being opened. Watch for signs of abrasion or rubbing. Clean the air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are signs of abrasion or rubbing, replace the air-flow sensor. Connect ohmmeter to term. 7 and term. 8 of air-flow sensor. Measure resistance. Deflect air-flow sensor flap.

### Test specifications

Air-flow sensor 0 280 202 007:  
100...500  $\Omega$

Air-flow sensor 0 280 202 007:  
(as of FD 147): 200...1000  $\Omega$

Air-flow sensor 0 280 202 024:  
200...1000  $\Omega$

### How to remove:

To remove the air-flow sensor, open the 4 clamp fasteners on the air filter and loosen the air hose. Unscrew the 4 fastening screws of the air-flow sensor from inside the top part of the air filter.

### Caution:

After testing is completed, refit the hose between air filter and air-flow sensor. Securely tighten the hose clamp (leaks).

yes

Continued on J 1/J 2



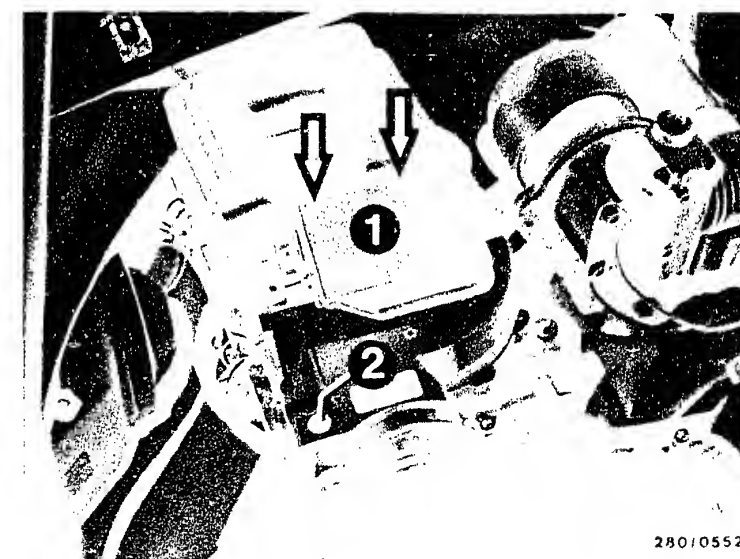
Arrow = Opening the air-flow sensor flap

1 = Air-flow sensor

2 = Bypass screw  
(CO adjustment)

Turning in clockwise direction  
= richer mixture

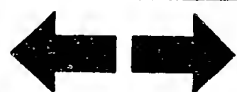
Arrows = Fastening screws



**H23**

Fuel consumption too high

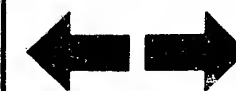
Opel Commodore, Senator, Monza



**H24**

Fuel consumption too high

Opel Commodore, Senator, Monza



# Fuel consumption too high (Continued)

CO and engine speed correctly adjusted?

No

## CO and idle adjustment

Exhaust-gas test with CO analyzer with engine at normal operating temperature and at idle speed

Idle speed 2.5 E engine:

Manually-shifted transmission  $800 \dots 850 \text{ min}^{-1}$

Automatic transmission

(Selector lever in position "P")

$800 \dots 850 \text{ min}^{-1}$

Idle speed 3.0 E engine:

Manually-shifted transmission  $850 \dots 900 \text{ min}^{-1}$

Automatic transmission

(Selector lever in position "P")

$850 \dots 900 \text{ min}^{-1}$

CO setting for both engines:  $\text{max. } 1.0 \% \text{ by vol. CO}$

Let warmed-up engine idle with the air conditioner (if fitted) switched off. Connect connecting leads on solenoid-operated air valve to battery voltage. Engine speed is increased by approx.  $150 \text{ min}^{-1}$ . If there is no change in engine speed, replace the solenoid-operated air valve.

If CO concentration too high, turn bypass screw (CO adjusting screw) in air-flow sensor half a turn in a counterclockwise direction. Check engine speed and CO concentration again. Carry out adjustments in several steps. After adjusting, use new plugs.

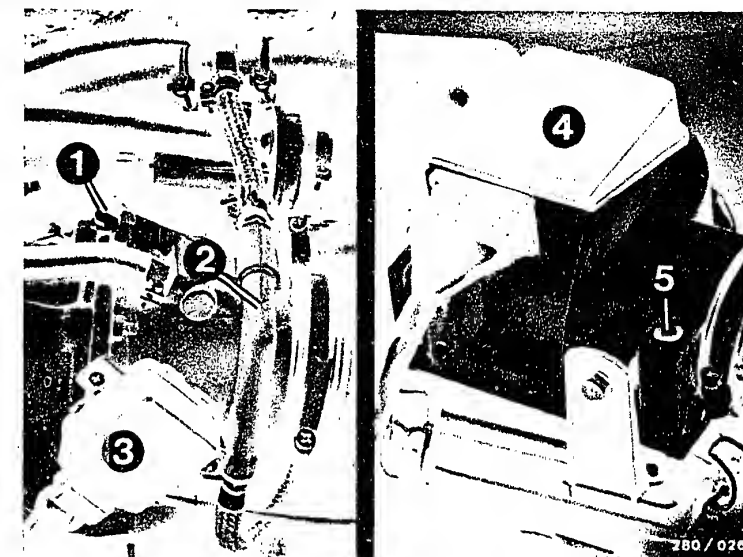
As of FD 246: CO adjusting screw with hexagon-socket-head AF 5.

Yes

Can engine speed not be adjusted?

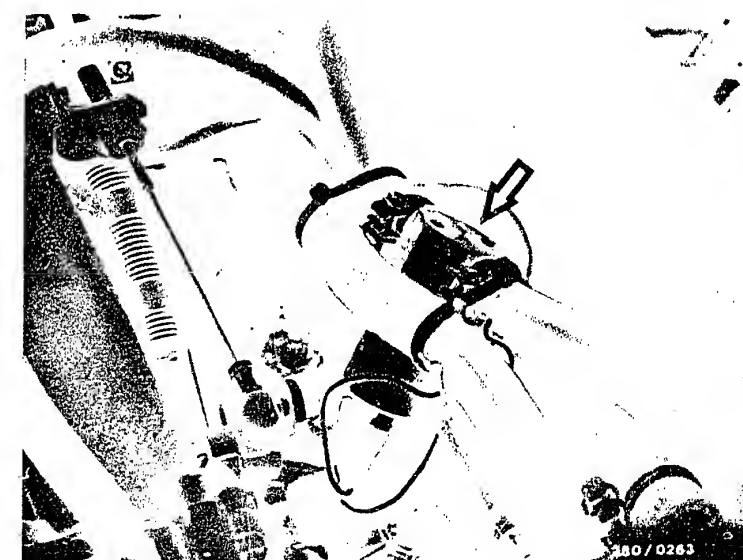
Yes

Continued on J 3/J 4



- 1 = Idle-speed-adjusting screw
- 2 = Throttle-valve preheating
- 3 = Throttle-valve switch
- 4 = Air-flow sensor
- 5 = CO adjusting screw

Arrow = Solenoid-operated air valve



J1

Fuel consumption too high

Opel Commodore, Senator, Monza



J2

Fuel consumption too high

Opel Commodore, Senator, Monza





Fuel consumption too high (continued)

Yes

Testing completed  
for customer  
complaint

"Fuel consumption  
too high"

Customer complaint  
remedied?

No

Further possibilities:

- Customer complaint incorrectly diagnosed. If the fault has not been detected by "direct trouble-shooting", see "detailed trouble-shooting" (Coordinates B3/B4).
- Engine not mechanically O.K. (Compression, valve setting, valve timing, worn camshaft).

**J3**

Fuel consumption too high

Opel Commodore, Senator, Monza



**J4**

Fuel consumption too high

Opel Commodore, Senator, Monza





## Trouble-shooting program according to customer complaints

### How to use the following trouble-shooting program

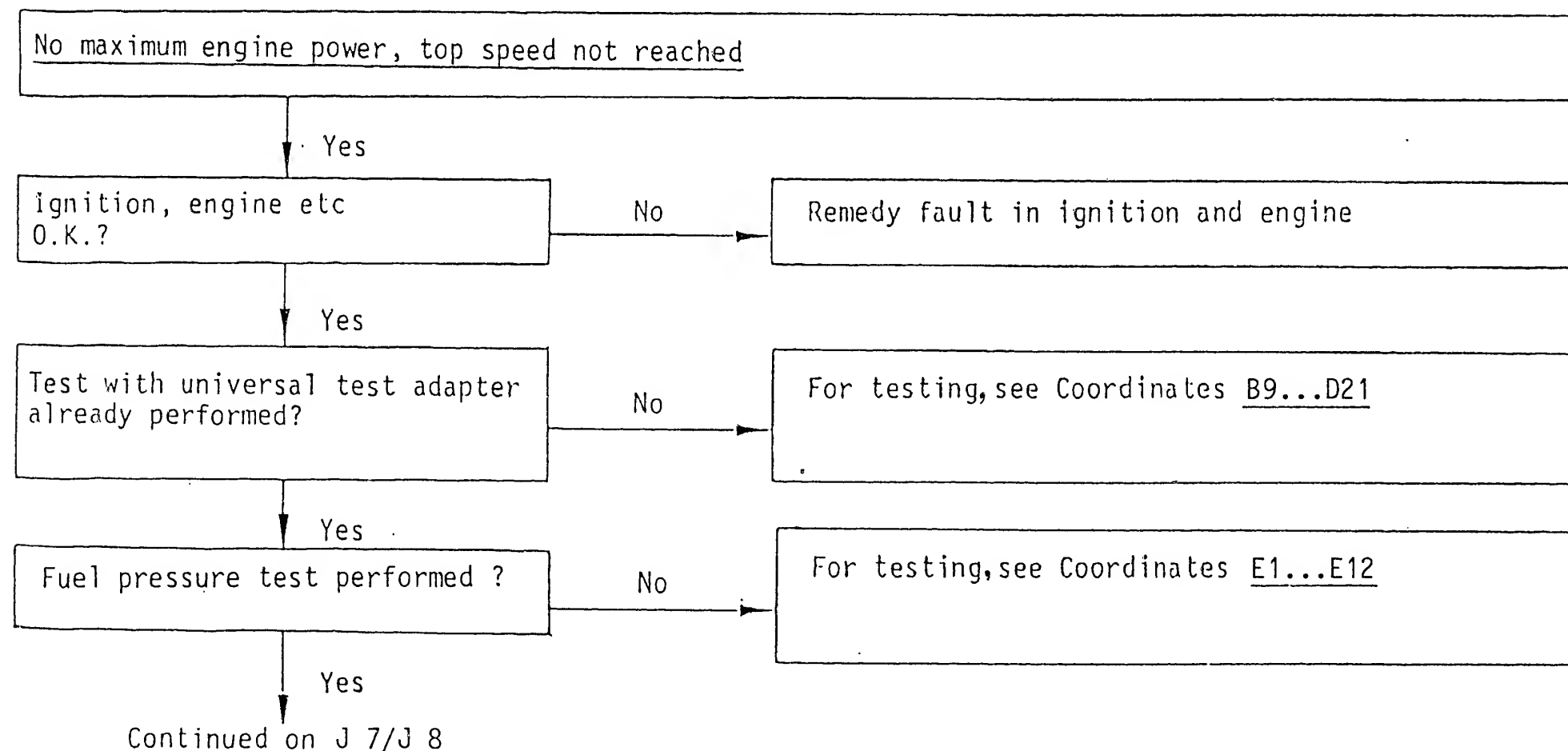
The program is divided into three rows of boxes:

1. The left-hand row contains the questions on the tests.
2. The middle row contains descriptions of the testing and adjustment operations on the components.
3. The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row and carry out the tests given there.

When you have finished testing, continue trouble-shooting at the point at which you branched off.



**J5**

No maximum engine power  
Opel Commodore, Senator, Monza



**J6**

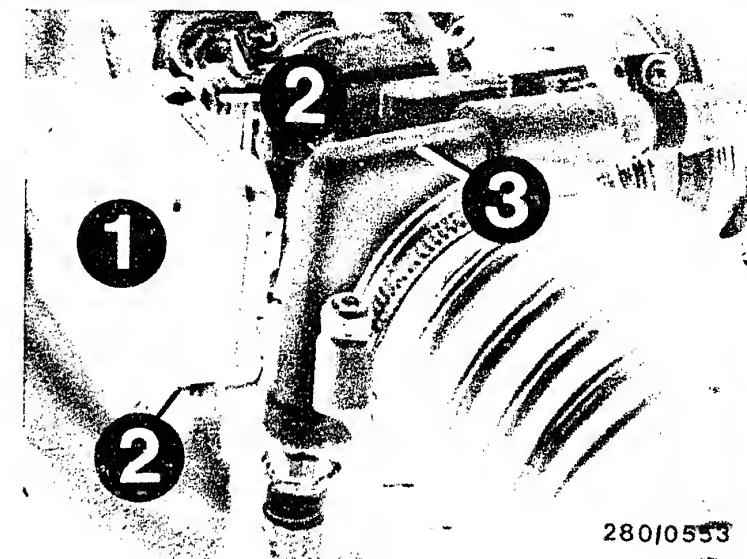
No maximum engine power  
Opel Commodore, Senator, Monza



No maximum engine power, top speed not reached (continued)

Does throttle valve open fully?

No  
Throttle linkage, accelerator pedal O.K.?  
Straighten linkage if necessary. Throttle linkage may stick due to floor mat etc.  
Check plug-in connections. Direct resistance measurement at throttle-valve switch between term. 18 and term. 3 (open throttle valve fully).  
If necessary, replace throttle-valve switch.  
Check for open circuit in lead from multiple plug term. 3 to throttle-valve switch term. 3.



280/0553

- 1 = Throttle-valve switch
- 2 = Fastening screws
- 3 = Throttle-valve preheating

Yes

Continued on J 9/J 10

**J7**

No maximum engine power  
Opel Commodore, Senator, Monza



**J8**

No maximum engine power  
Opel Commodore, Senator, Monza



No maximum engine power, top speed not reached (Continued)

Fuel delivery O.K.?

No

Measuring the fuel delivery:

For testing, undo the junction between the fuel return hose (from pressure regulator) and fuel return line (to fuel tank). If necessary, extend hose and lead into a 5 l vessel with graduated scale.

Remove air hose to air filter on air-flow sensor. Open air-flow sensor flap by hand until pump operates.

Test specification

2.5 E engine: min. 750 cm<sup>3</sup>/30 s

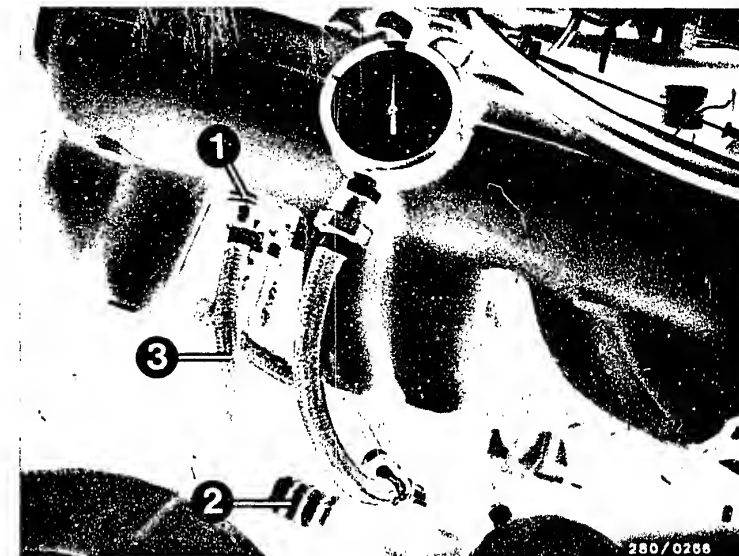
3.0 E engine: min. 850 cm<sup>3</sup>/30 s

Remedy if test specification not reached:

- Fuel filter clogged → Replace
- Voltage at fuel pump plugs, with engine running min. 12 V. If not, clean contacts, possibly eliminating poor ground connection. Replace leads.
- Fuel-pressure regulator defective → replace.
- Fuel pump delivery too low → replace fuel pump.

Caution!

After testing is completed, refit the hose between air filter and air-flow sensor. Securely tighten hose clamp. Check for leaks.



1 = Pressure regulator

2 = Fuel return line

3 = Fuel return hose

Yes

Continued on J 11/J 12

**J9**

No maximum engine power

Opel Commodore, Senator, Monza



**J10**

No maximum engine power

Opel Commodore, Senator, Monza



No maximum engine power, top speed not reached (continued)

Full-load enrichment O.K.?  
(Control unit function)

yes

Connect test lead as follows:

The two-pole connectors of the test lead are connected between an injection valve and its connecting lead. Of the other two clamps of the test lead, only one must be connected to the special input of the motor tester.

When the correct clamp is connected, the picture opposite will be visible on the oscilloscope.

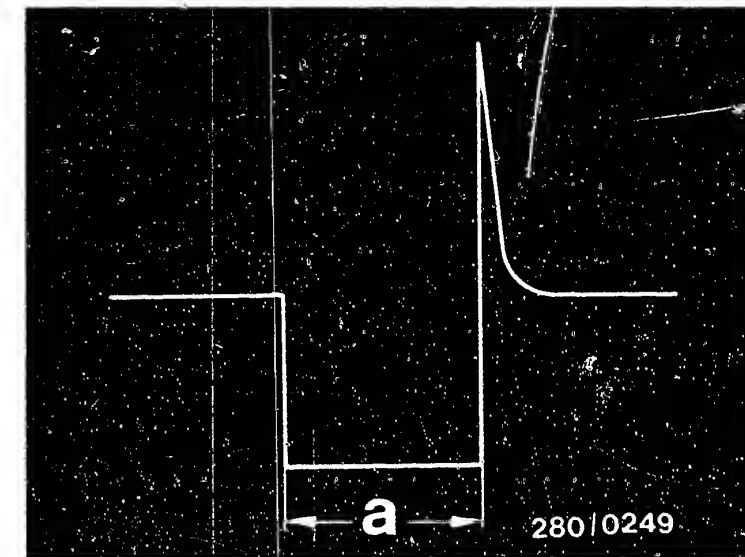
With the aid of the test lead it is possible to test the injection pulses with an ignition oscilloscope at the injection valves with the engine running.

If the picture opposite is not obtained or if there are deviations (interference, missing etc.), the other injection valves should also be tested.

In case of interference —> check routing of leads.

In case of missing —> eliminate loose contacts in leads or in plug-in connections.

Observe injection pulse at idle. Remove throttle-valve switch connector and bridge term. 3 and term. 18 (insulated wire jumper). Caution! Do not bend any of the terminals. Injection pulse must become longer. If not: check connecting leads from multiple plug to throttle-valve switch (term. 3 and term 18) for continuity. If O.K., replace control unit.



Injection pulse of a switched output stage

(measured at injection valve)

a = Pulse length  
(dependent on engine load)

Continued on J 13/J 14

J11

No maximum engine power

Opel Commodore, Senator, Monza



J12

No maximum engine power

Opel Commodore, Senator, Monza



No maximum engine power, top speed not reached (continued)

Air-flow sensor O.K.?

No

Testing:

Remove hose between air filter and air-flow sensor. Open air-flow sensor flap by hand. It must be possible to move the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. When released, the flap must close completely by itself. The sensor flap must not catch when it is being opened. Watch for signs of abrasion or rubbing. Clean the air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are signs of abrasion or rubbing, replace the air-flow sensor. Connect ohm-meter to term. 7 and term. 8 of air-flow sensor. Measure resistance. Deflect air-flow sensor flap.

Test specifications:

Air-flow sensor 0 280 202 007	100 ... 500 $\Omega$
Air-flow sensor 0 280 202 007	200 ... 1000 $\Omega$
(as of FD 147)	
0 280 202 024:	200 ... 1000 $\Omega$

How to remove:

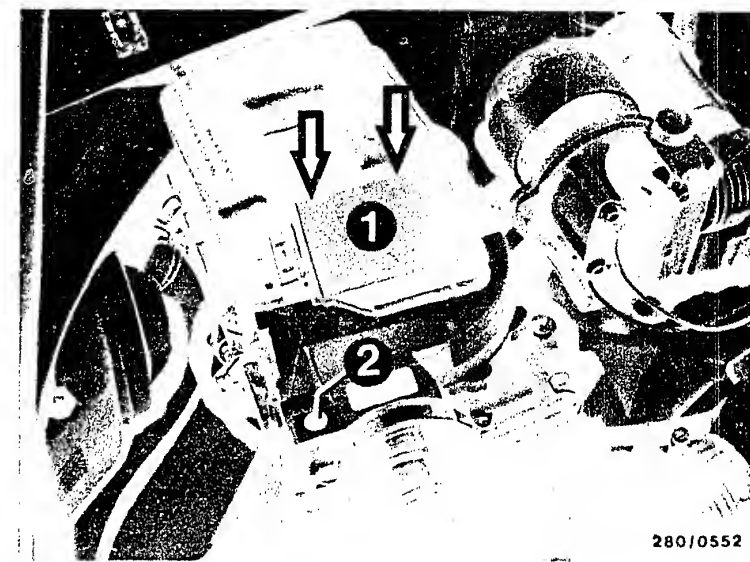
To remove the air-flow sensor, open the 4 clamp fasteners on the air filter and loosen the air hose. Unscrew the 4 fastening screws of the air-flow sensor from inside the top part of the air filter.

Caution:

After testing is completed, refit the hose between air filter and air-flow sensor. Securely tighten the hose clamp (leaks).

yes

Continued on J 15/J 16



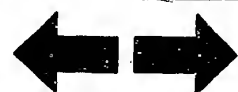
1 = Air-flow sensor  
2 = CO adjusting screw  
Arrows = Fastening screw

Arrow = Opening the air-flow sensor flap



**J13**

No maximum engine power  
Opel Commodore, Senator, Monza



**J14**

No maximum engine power  
Opel Commodore, Senator, Monza



No maximum engine power, top speed not reached (continued)

Are all hose-lines and electric leads securely attached?  
Visual examination. Is the air-intake system leak-tight?

No

Check whether hoses of air-intake system and of fuel line system are securely attached, not kinked, or damaged. If necessary, replace hoses. Eliminate leaks with new seals or by re-tightening the connecting screws.

Checking for leaks:

Seal off exhaust tail pipe. Screw off hose from air filter to air-flow sensor on air-flow sensor and seal off air-flow sensor duct. Pull off hose after auxiliary-air device and blow air (0.3 bar) into the intake manifold with a compressed-air gun. Seal off connection port on auxiliary-air device. Open throttle valve fully while doing this. Brush or spray all joints with soapy water. Bubbling or foaming indicates a leak. Check electric contacts for loose connection.

Yes

Testing completed  
for customer  
complaint

"No maximum engine  
power".

Customer complaint  
remedied?

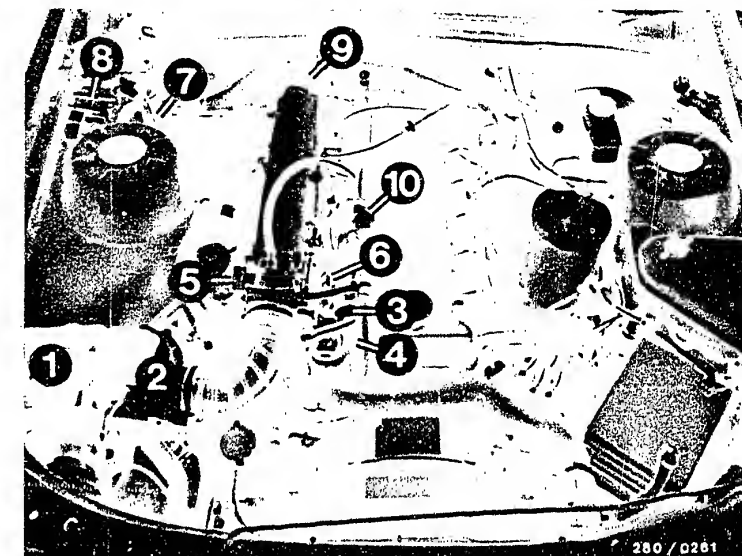
No

Further possibilities:

- Customer complaint incorrectly diagnosed.

If the fault has not been detected by "direct trouble-shooting", see "detailed trouble-shooting" (Coordinates B3/B4).

- Engine not mechanically O.K. (Compression, valve setting, valve timing, worn camshaft).



Overall view of engine

- 1=Air filter
- 2=Air-flow sensor
- 3=Auxiliary-air device
- 4=Temperature sensor II (water)
- 5=Throttle-valve switch
- 6=Injection valves
- 7=Relay set
- 8=Series resistors
- 9=Central ground
- 10=Solenoid-operated air valve

**J15**

No maximum engine power

Opel Commodore, Senator, Monza



**J16**

No maximum engine power

Opel Commodore, Senator, Monza



## Trouble-shooting program according to customer complaints

### How to use the following trouble-shooting program

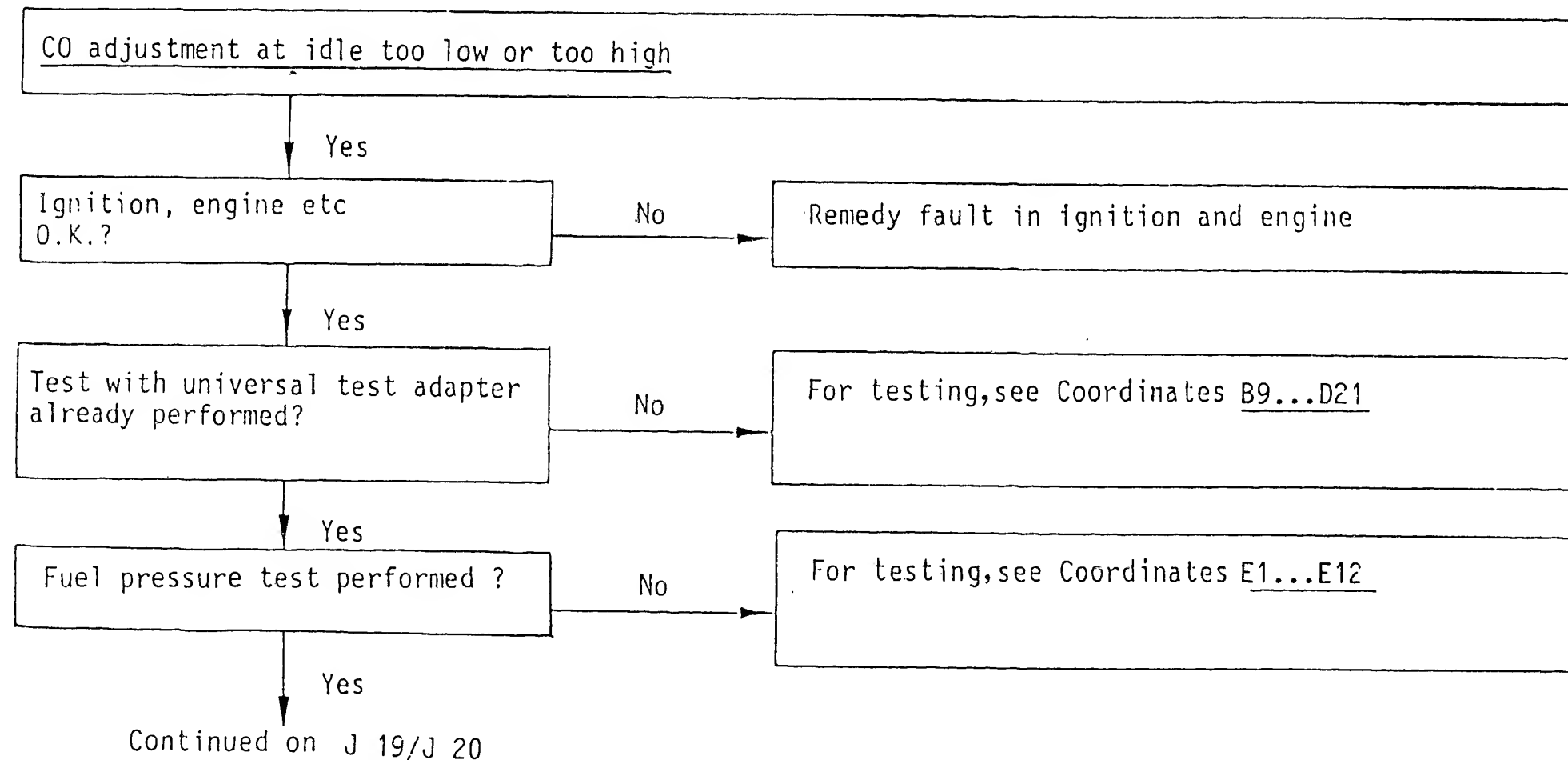
The program is divided into three rows of boxes:

1. The left-hand row contains the questions on the tests.
2. The middle row contains descriptions of the testing and adjustment operations on the components.
3. The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row and carry out the tests given there.

When you have finished testing, continue trouble-shooting at the point at which you branched off.

**J17**

CO adjustment  
Opel Commodore, Senator, Monza

**J18**

CO adjustment  
Opel Commodore, Senator, Monza





# CO adjustment at idle too low or too high (continued)

CO and engine speed correctly adjusted?

Yes

Can engine speed not be adjusted?

Yes

Continued on J 21/J 22

No

## CO and idle adjustment

Exhaust-gas test with CO analyzer with engine at normal operating temperature and at idle speed

Idle speed 2.5 E engine:

Manually-shifted transmission  $800 \dots 850 \text{ min}^{-1}$

Automatic transmission  
(Selector lever in position "p")  $800 \dots 850 \text{ min}^{-1}$

Idle speed 3.0 E engine:

Manually-shifted transmission  $850 \dots 900 \text{ min}^{-1}$

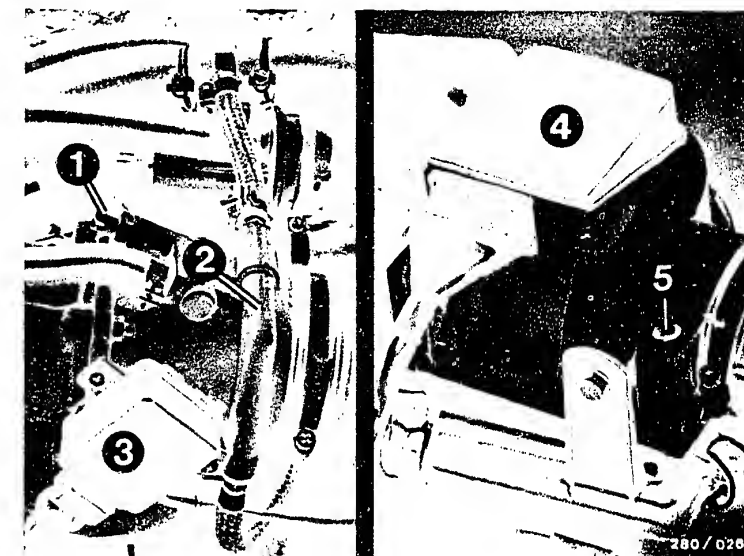
Automatic transmission  
(Selector lever in position "p")  $850 \dots 900 \text{ min}^{-1}$

CO setting for both engines:  $\text{max. } 1.0 \% \text{ by vol. CO}$

Let warmed-up engine idle with the air conditioner (if fitted) switched off. Connect connecting leads on solenoid-operated air valve to battery voltage. Engine speed is increased by approx.  $150 \text{ min}^{-1}$ . If there is no change in engine speed, replace the solenoid-operated air valve.

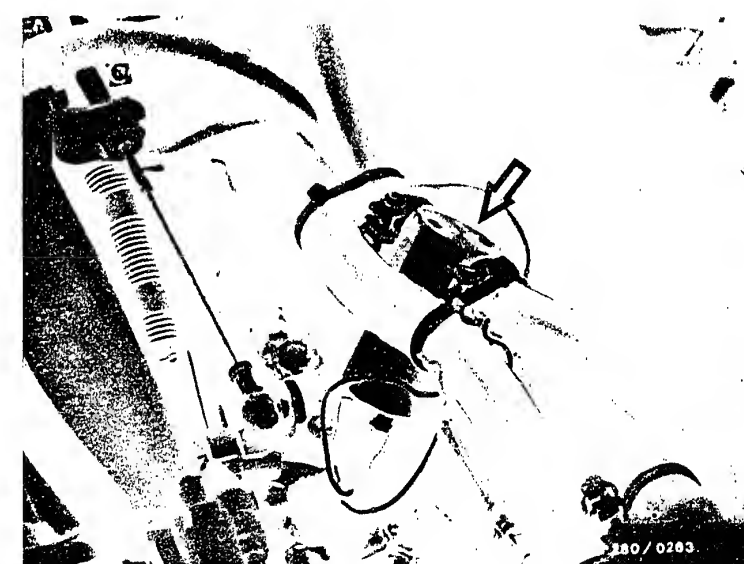
If CO concentration too high, turn bypass screw (CO adjusting screw) in air-flow sensor half a turn in a counterclockwise direction. Check engine speed and CO concentration again. Carry out adjustments in several steps. After adjusting, use new plugs.

As of FD 246: CO adjusting screw with hexagon-socket-head AF 5



- 1 = Idle-speed-adjusting screw
- 2 = Throttle-valve preheating
- 3 = Throttle-valve switch
- 4 = Air-flow sensor
- 5 = CO adjusting screw

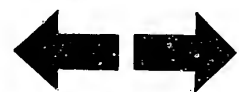
Arrow = Solenoid-operated air valve



**J 19**

CO adjustment

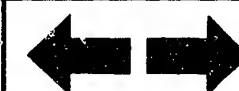
Opel Commodore, Senator, Monza



**J 20**

CO adjustment

Opel Commodore, Senator, Monza



# CO adjustment at idle too low or too high (continued)

Air-flow sensor O.K.?

no

## Testing:

Remove hose between air filter and air-flow sensor. Open air-flow sensor flap by hand. It must be possible to move the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. When released, the flap must close completely by itself. The sensor flap must not catch when it is being opened. Watch for signs of abrasion or rubbing. Clean the air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are signs of abrasion or rubbing, replace the air-flow sensor. Connect ohmmeter to term. 7 and term. 8 of air-flow sensor. Measure resistance. Deflect air-flow sensor flap.

## Test specifications

Air-flow sensor 0 280 202 007:  
100...500  $\Omega$

Air-flow sensor 0 280 202 007:  
(as of FD 147): 200...1000  $\Omega$

Air-flow sensor 0 280 202 024:  
200...1000  $\Omega$

## How to remove:

To remove the air-flow sensor, open the 4 clamp fasteners on the air filter and loosen the air hose. Unscrew the 4 fastening screws of the air-flow sensor from inside the top part of the air filter.

## Caution:

After testing is completed, refit the hose between air filter and air-flow sensor. Securely tighten the hose clamp (leaks).

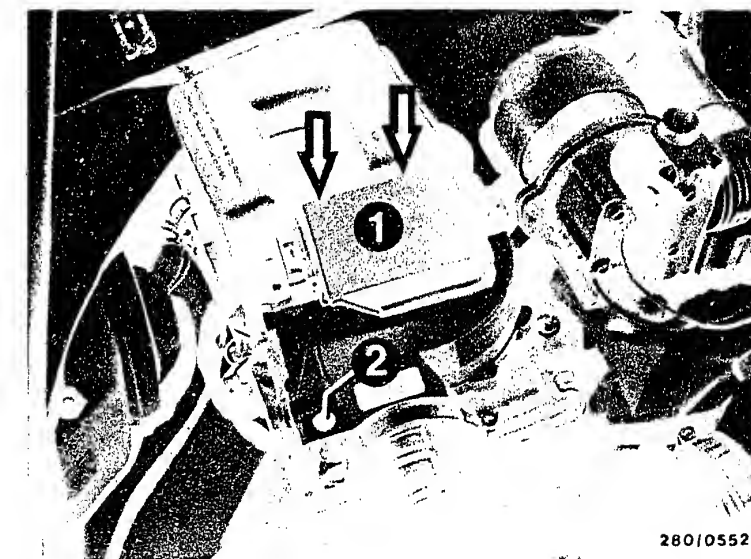
yes

Continued on J 23/J 24



Arrow = Opening the air-flow sensor flap

1 = Air-flow sensor  
2 = CO adjustment  
Arrows = Fastening screws



**J21**

CO adjustment

Opel Commodore, Senator, Monza



**J22**

CO adjustment

Opel Commodore, Senator, Monza



## CO adjustment at idle too low or too high (continued)

CO concentration below tolerance?

max. 1.0 vol % CO

Temperature sensors O.K.?

No

### Testing the temperature sensor:

Using ohmmeter, make direct resistance measurement at temperature sensor II (engine). Resistance measurement at term. 13 and term. 49 (ground);

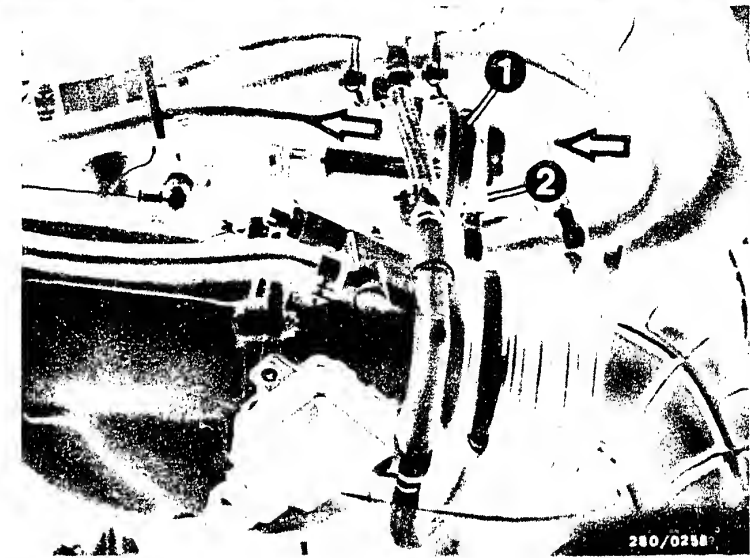
At ambient temperature (approx. +15...+30°C):	1.45...3.3 k $\Omega$
With engine at op. temp. (approx. +80°C):	280...360 $\Omega$

If incorrect, check the following leads for open circuit and short circuit using ohmmeter:

- From multiple plug term. 13 to temperature sensor II term. 13.
- From temperature sensor II term. 49 to central ground (lead 49). Check all contacts in the plug-in connections.

yes

Continued on K 1/K 2



- 1 = Auxiliary-air device  
2 = Temperature sensor II (engine)  
3 = Direction of flow

**J23**

CO adjustment

Opel Commodore, Senator, Monza



**J24**

CO adjustment

Opel Commodore, Senator, Monza



## CO adjustment at idle too low or too high (continued)

CO concentration above tolerance?

0,3 % vol. CO

Air-intake system leak-tight?

No

### Checking for leaks:

Seal off exhaust tail pipe. Screw off hose from air filter to air-flow sensor on air-flow sensor and seal off air-flow sensor duct. Remove hose after auxiliary-air device and blow air (0.3 bar) into the intake manifold with a compressed-air gun. Seal off connection port on auxiliary-air device. Open throttle valve fully while doing this. Brush or spray all joints with soapy water. Bubbling or foaming indicates a leak.

Yes

Testing completed for customer complaint

"CO-Setting".

Customer complaint remedied?

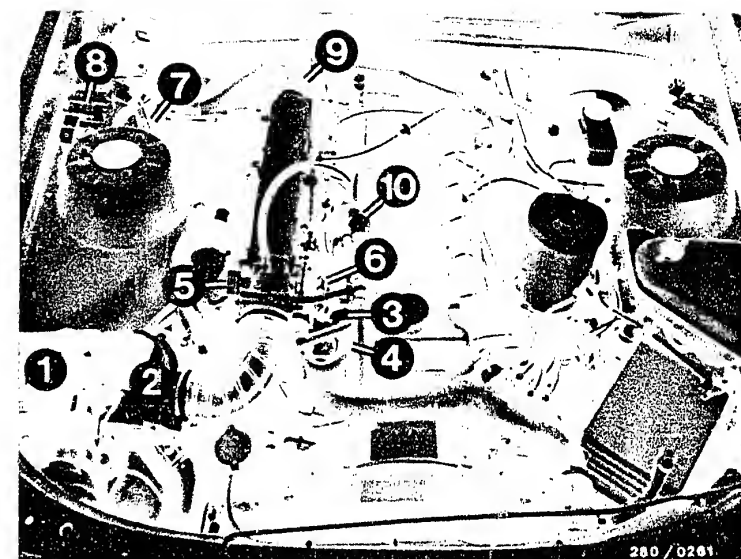
No

### Further possibilities

- Customer complaint incorrectly diagnosed.

If the fault has not been detected by "direct trouble-shooting", see "detailed trouble-shooting" (see coordinates B3 - B8).

- Engine not mechanically O.K. (Compression, valve setting, valve timing, worn camshaft).



Overall view of engine

1 = Air filter

2 = Air-flow sensor

3 = auxiliary-air device

K1

CO adjustment

Opel Commodore, Senator, Monza



K2

CO adjustment

Opel Commodore, Senator, Monza



# After-sales Service

## Technical Bulletin

Only for use within the Bosch organization. Not to be communicated to any third party.

CAR ALARM II, RETROFITTING  
in vehicles equipped with L-Jetronic

VDT-I-280/103 En

7.1981  
Supersedes Ed. 9.1980

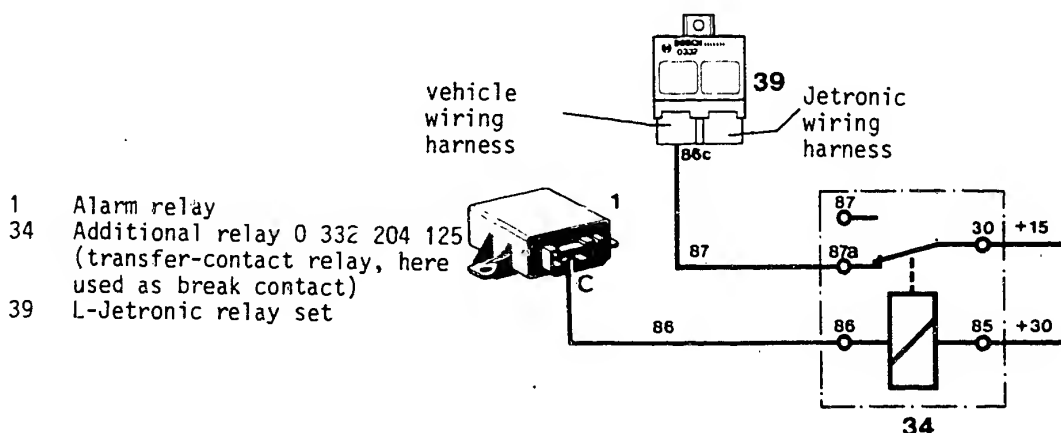
In case where Car Alarm II (0 335 411 901) is retrofitted in vehicles equipped with L-Jetronic, the terminal 1 of the ignition coil must NOT be connected to terminal "C" of the alarm relay. When the Car Alarm is switched on, terminal "C" of alarm relay is switched internally to vehicle ground. This would mean that when attempts are made to start the vehicle with the alarm switched on, the ignition coil and the L-Jetronic control unit would be destroyed. This also means though, that full protection against theft is no longer possible as would normally be the case with the ignition switched off and with the alarm installation primed.

A circuit has now been developed which ensures complete theft protection for L-Jetronic vehicles as well.

### Description of the circuit

Open-circuit the line "15" leading to terminal "86c" of the relay set using an additional relay (34) 0 332 204 125. This relay ensures that when the alarm installation is primed, the supply voltage to the control unit is switched off and hence the control unit no longer functions.

The additional relay (34) 0 332 204 125 is controlled by terminal "C" of the alarm relay (see circuit diagram).



**BOSCH**

Geschäftsbereich: ZH Kundendienst, Kfz-Ausrüstung  
© by Robert Bosch GmbH, D-7 Stuttgart 1, Postfach 50 Printed in the Federal Republic of Germany  
Imprimé en République Fédérale d'Allemagne par Robert Bosch GmbH.

**L1**

Technical Bulletins

Opel Commodore, Senator, Monza



# After-sales Service

## Technical Bulletin

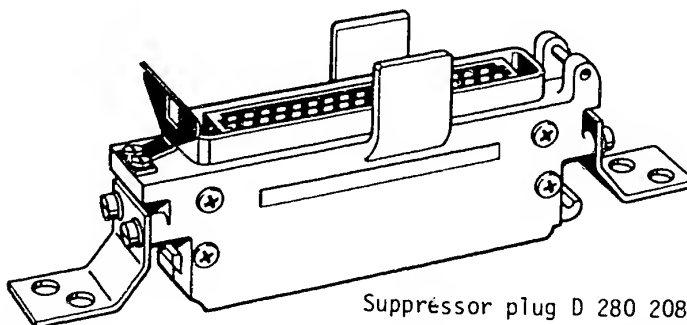
Only for use within the Bosch organization. Not to be communicated to any third party.

PERMANENTLY INSTALLED AND PORTABLE TRANSMITTER  
INSTALLATIONS FITTED IN VEHICLES EQUIPPED WITH  
L-JETRONIC

VDT-I-280/106 En  
4.1981

If, in vehicles equipped with L-Jetronic and in which transmitter installations are operated, whether permanently installed or removable and portable, malfunctions occur whilst the vehicle is being driven (the engine shakes or stops etc.), the following measures can be taken to remedy these faults:

- The hinges for the engine hood and the luggage-compartment lid are to be bridged with a flexible copper braided grounding strip (efficient grounding!).
- The antenna base is to be connected to the vehicle chassis using a copper grounding strip to ensure clean, 100% connection.
- Locate the transmitter and its antenna as far away as possible from the L-Jetronic control unit.
- Tune the transmitter to the antenna in order to achieve the minimum reflection coefficient.
- The parallel routing of the cables for the transmitter power supply and the antenna with the L-Jetronic wiring harness is to be avoided (danger of cross-coupling and cross-talk).



Suppressor plug D 280 208 091

If the disturbances and complaints continue even though the above measures have been taken, then the degree of suppression can be improved by incorporating the suppression plug D 280 208 091 between the wiring-harness plug and the L-Jetronic control unit.

**BOSCH**

Geschäftsbereich KH, Kundendienst, Kfz-Ausrüstung  
© by Robert Bosch GmbH, D-7 Stuttgart 1, Postfach 50 Printed in the Federal Republic of Germany  
Imprimé en République Fédérale d'Allemagne par Robert Bosch GmbH

**L2**

Technical Bulletins

Opel Commodore, Senator, Monza



Ordering

REGE/AV is to order direct from KH/VKD2.

Price

Available upon request.

**L3**

Technical Bulletins

Opel Commodore, Senator, Monza





# After-sales Service

## Motor Vehicle Service Information

Only for use within the Bosch organization. Not to be communicated to any third party.

### UNIVERSAL TEST ADAPTER

VDT-I-Gen. 1001 En

1.1982

#### 1. Application

The multiplicity of different fuel-injection and ignition systems at present available on the market, as well as the advances in development which can be expected in the future, demand a new testing concept. In order to maintain the outlay for test equipment, and hence the costs, at a reasonable limit we have developed the universal test adapter.

The following systems can be tested using a test-adapter universal unit together with adapter leads suited to the system in question:

##### 1.1 Systems which are already being fitted as series:

- L-Jetronic (1st generation)
- LE-Jetronic (2nd-generation L-Jetronic)
- Motronic (with the new connector designation, refer to the vehicle-specific instructions!)

##### 1.2 Systems whose introduction is planned:

- Motronic with gearbox control
- KE-Jetronic
- Mono-Jetronic
- Electronic ignition system with ignition map (EZF)

#### 2. Delivery dates and Part Numbers

Available as from 2.1982.

##### 2.1 Universal test adapter (basic unit)

Part Number: 0 684 101 801

Designation: ETT 018.01

##### 2.2 System adapter lead for LE-Jetronic (2nd-generation L-Jetronic)

Part Number 1 684 463 123

First application: For BMW 2.5/2.8 l engines as from 9.1981, and for Opel 2.0 l engines (Manta/Rekord) as from 9.1981.

**BOSCH**

Geschäftsbereich KH Kundendienst Kfz-Ausrüstung  
© by Robert Bosch GmbH, D-7 Stuttgart 1, Postfach 50 Printed in the Federal Republic of Germany  
Imprimé en République Fédérale d'Allemagne par Robert Bosch GmbH

**L4**

Service Information

Opel Commodore, Senator, Monza



### 2.3 System adapter lead for Motronic with new connector assignment.

(Refer to the vehicle-related instructions!)

Part Number : 1 684 463 124

First application: Porsche 944 as from series production, BMW as from about 3.1982 (Europe)

### 2.4 System adapter lead for L-Jetronic (in preparation)

Further system adapter leads will be made available along with the introduction of the new systems as mentioned above.

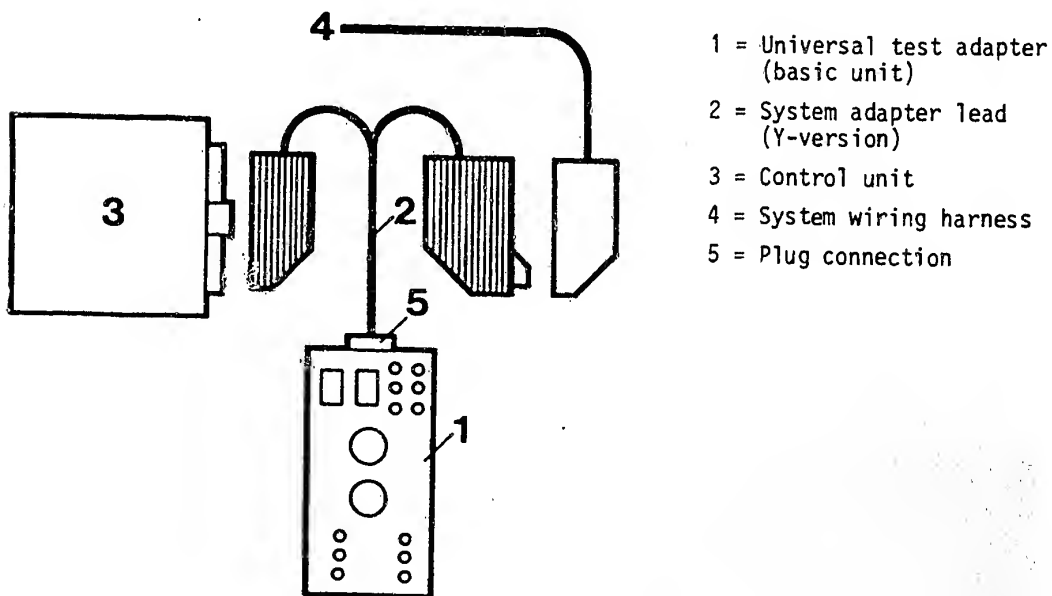
### 3. Testing procedure

The systems and the components are tested for voltage and resistance values as well as for correct functioning. Evaluation is by means of a multimeter and the Motortester which are connected into the universal test adapter.

Depending upon the complexity of the system, interchangeable adapter lead model 1 or model 2 is provided:

#### 3.1 Adapter lead for peripheral and function testing (Model 1)

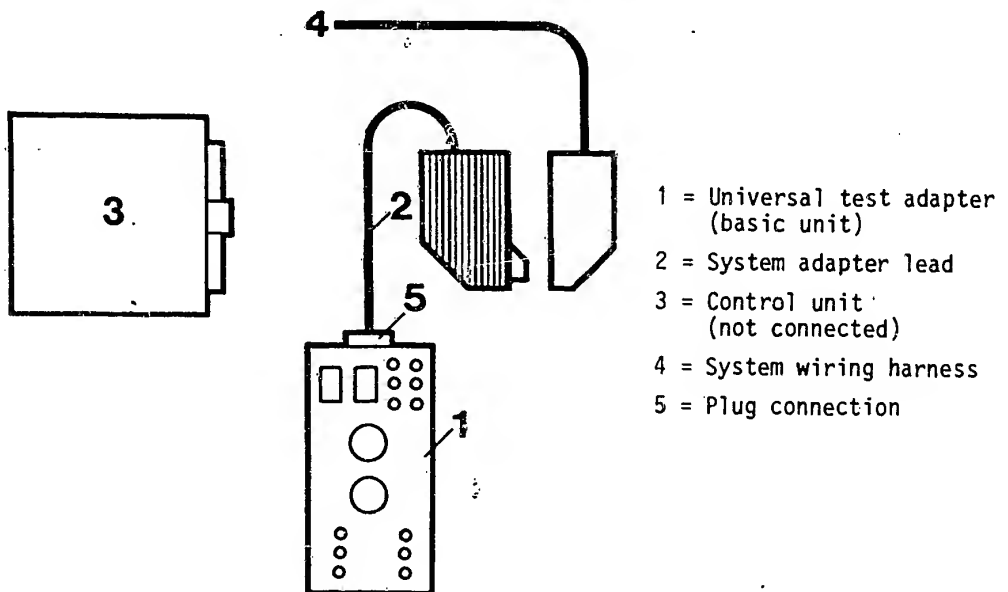
The universal test adapter together with the system adapter lead is to be connected to the system wiring harness and to the control unit (e.g. Motronic).  
To be tested: Wiring harness with components and control unit.



### 3.2 Adapter lead for peripheral testing (Model 2)

The universal test adapter with system adapter lead, is only to be connected to the system wiring harness (e.g. LE-Jetronic (2nd-generation L-Jetronic)).

To be tested: Wiring harness with components (without control unit).

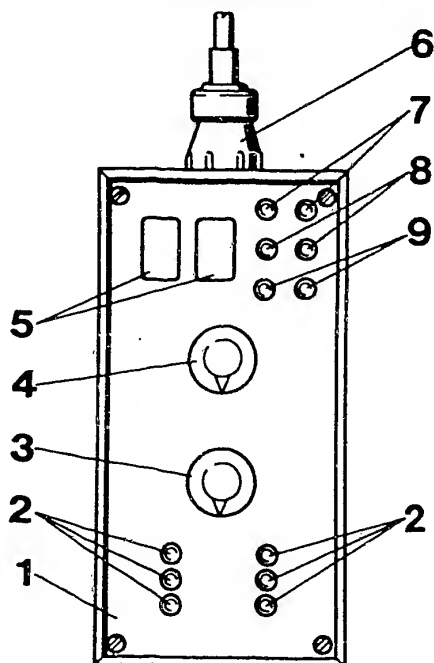


### 4. Construction of the universal test adapters

The universal test adapter is fitted with 2 program switches, footage and resistance measurement. The measured values are displayed on the multimeter connected to the universal test adapter. For reasons of safety, the voltage and resistance sockets are separated. In order to measure signals (e.g. injection pulses, ignition pulses), it is necessary to connect a Motortester to the measuring cavities (special input).

When carrying out functional tests with the control unit connected, selected push-buttons are pressed in a number of test-program steps in order to simulate a variety of different engine operating conditions the influence of which is evaluated using the Motortester.





- 1 = Universal test adapter (basic unit)
- 2 = Keyboard for simulation of various conditions e.g. engine temperature, throttle position etc.
- 3 = Program switch "Ohm" for resistance measurement
- 4 = Program switch "Volt" for voltage measurement
- 5 = Measurement "cavities" (for the special input from the Motortester)
- 6 = 63-pole plug-in connection for connecting the system adapter lead
- 7 = Measurement sockets (voltage measurement with a multimeter or with the Motortester)
- 8 = Measurement sockets (resistance measurement with the multimeter)
- 9 = Sockets for special functions (not yet allocated)

Notes:

1. The Motronic test adapter (0 684 101 800, ETT 018.00) will continue to be used for Motronic-equipped BMW vehicles (with old connector assignment) up to about year of manufacture 3.1982 (refer to vehicle-specific instructions).
2. Details on the operation of the universal test adapter, and the test specs, are to be found in the vehicle-specific after-sales service instructions.

3. Caution! Change of Part Number:

On the SIS-microfiches OPE-00/J22 (Coordinates A14 and A17) the new Part Numbers are as follows:

Universal test adapter: 0 684 101 801

Adapter lead : 1 684 463 123



## TABLE OF CONTENTS

When direct trouble-shooting a specific L-Jetronic component, it is absolutely necessary to look up the respective test step according to the customer complaint.

<u>Section</u>	<u>Coordinates</u>
Structure of microfiche	A 1
Rapid diagnosis chart for universal test adapter	A 2 - A 6
Test specifications	A 7 - A 8
Electrical terminal diagram	A 9 - A 10
Electrical wiring diagram	A 11 - A 12
Diagram of air and fuel hoses	A 13 - A 14
Diagram of fuel lines	A 15
Test equipment and tools	A 16 - A 19
Installation position of components	A 20 - A 22
General information	A 23
 Trouble-shooting	 B 1 - B 8
Detailed trouble-shooting	B 3 - B 4
Direct trouble-shooting	B 5 - B 8
 Test chart for universal test adapter	 B 9 - D 21
 Fuel pressure test	 E 1 - E 12
 <u>Customer complaint: starting motor operates, engine fails to start or starts only with great difficulty</u>	  E 13 - E 22
Auxiliary-air device	E 15 - E 16
Temperature sensors	E 17 - E 18
Air-flow sensor	E 19 - E 20
Hose lines, electrical lead connections and leak test	E 21 - E 22



<u>Customer complaint: engine starts but then dies</u>	F 1 - F 12
Auxiliary-air device	F 3 - F 4
Temperature sensors	F 5 - F 6
Air-flow sensor	F 7 - F 10
Hose lines, electrical lead connections and leak test	F 11 - F 12
 <u>Customer complaint: uneven engine idle</u>	 F 13 - G 8
Throttle valve adjustment	F 15 - F 16
CO and idle adjustment	F 15 - F 18
Solenoid-operated air valve	F 15 - F 16
Temperature sensors	F 19 - F 20
Auxiliary-air device	F 21 - F 22
Injection valve (electrical and operation with test lead)	F 21 - F 24
Air-flow sensor	G 1 - G 2
Hose lines, electrical lead connections and leak test	G 3 - G 4
CO and idle adjustment (repeat)	G 5 - G 6
Solenoid-operated air valve	G 5 - G 6
 <u>Customer complaint: poor throttle take-up</u>	 G 9 - G 24
Temperature sensors	G 11 - G 12
Functional test of injection valves (connecting the test lead)	G 13 - G 14
Auxiliary-air device	G 15 - G 16
Air-flow sensor	G 15 - G 20
Hose lines, electrical lead connections and leak test	G 19 - G 20
Throttle valve adjustment	G 21 - G 22
CO and idle adjustment	G 21 - G 22
Solenoid-operated air valve	G 21 - G 22



<u>Customer complaint: Engine missing under all operating conditions</u>	H 1 - H 16
Plug-in connections	H 3 - H 4
Power supply	H 3 - H 4
Voltage peaks (connecting the test lead)	H 5 - H 6
Air-flow sensor, noise test	H 7 - H 10
Fuel delivery	H 11 - H 12
Control unit	H 11 - H 12
Burbling	H 13 - H 14
Solenoid-operated air valve	H 13 - H 14

<u>Customer complaint: Fuel consumption too high</u>	H 17 - J 4
Temperature sensors	H 19 - H 20
Mechanical test of injection valve	H 21 - H 22
Electrical test (functional test) of injection valve	H 21 - H 22
Air-flow sensor	H 23 - H 24
CO and idle adjustment	J 1 - J 2
Solenoid-operated air valve	J 1 - J 2

<u>Customer complaint: No maximum engine power, top speed not reached</u>	J 5 - J 16
Throttle-valve adjustment	J 7 - J 8
Fuel delivery	J 9 - J 10
Full-load enrichment in control unit	J 11 - J 12
Air-flow sensor	J 13 - J 14
Hose lines, electrical lead connections and lead test	J 15 - J 16





Customer complaint: CO adjustment at idle too

Low or too high	J 17 - K 2
CO and idle adjustment	J 19 - J 20
Solenoid-operated air valve	J 19 - J 20
Air-flow sensor	J 21 - J 22
Temperature sensors	J 23 - J 24
Leak test	K 1 - K 2

Technical Bulletins	L 1 - L 3
Service Information	L 4 - L 7

© 1983 Robert Bosch GmbH  
Automotive Equipment - After-Sales Service,  
Department for Technical Publications KH/VDT,  
Postfach 50, D-7000 Stuttgart 1

Published by: After-Sales Service, Department for  
Training and Technology (KH)VSK). Press date: 9.1983

Please direct questions and comments concerning the  
contents to our authorized representative in your  
country.

This publication is only for the use of the Bosch  
After-Sales Service Organization, and may not be passed  
on to third parties without our consent.

Microfilmed in the Federal Republic of Germany.  
Microphotographié en République Fédérale d'Allemagne.

